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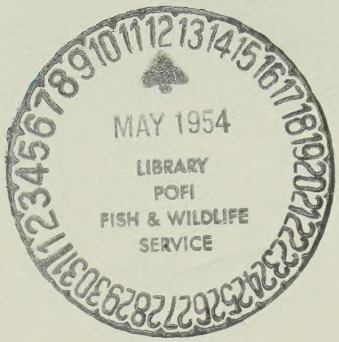

SPC
SOUTH PACIFIC COMMISSION

quarterly BULLETIN

VOL. 4. NO. 1 JANUARY, 1954

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Australian School of Pacific Administration

PUBLISHED BY THE SOUTH PACIFIC COMMISSION, NOUMEA, NEW CALEDONIA

THE SOUTH PACIFIC COMMISSION

The South Pacific Commission is an advisory and consultative body set up by the six Governments responsible for the administration of Island Territories in the South Pacific region. Its purpose is to recommend to the member Governments means for promoting the well-being of the people of these territories. It is concerned with social, economic and health matters. Its headquarters are at Noumea, New Caledonia.

The Commission was established by an Agreement between the Governments of Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America, signed at Canberra on the 6th February, 1947, and finally ratified on the 29th July, 1948. Until the 7th November, 1951, the area of the Commission's activities comprised territories lying generally south of the equator from and including Netherlands New Guinea in the west to the French Establishments in Oceania and Pitcairn in the east. On 7th November, 1951, an additional Agreement was signed at Commission headquarters in Noumea on behalf of the six participating Governments, extending the scope of the Commission to include Guam and the Trust Territory of the Pacific Islands under United States administration.

The Commission consists of twelve Commissioners, two from each Government, and meets twice a year. The first Session was held in May, 1948. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council, which assembles once a year, held its first meeting in May, 1949. Members are appointed by the Commission, and are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Suva in April, 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April, 1953.

The Commission's staff includes six principal officers, as follows: Secretary-General, Sir Brian Freeston, K.C.M.G., O.B.E.; Deputy Chairman of the Research Council, Dr. E. M. Ojala; Deputy Secretary-General, Mr. John Ryan; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Mr. H. E. Maude, O.B.E. The Deputy Chairman and the three Executive Officers are ex officio members of the Research Council. The principal officers are supported by a small technical and administrative staff.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Noumea, New Caledonia.

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THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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Rehabilitating The Coconut Industry

At the Eighth Pacific Science Congress held at Manila from 16th - 28th November, the following paper was presented on the rehabilitation of coconut cultivation in the Pacific islands. It was prepared by . . .

W. V. D. PIERIS

Technical Officer (Copra),

South Pacific Commission

Mr. Pieris examining a coconut nursery on Ant Atoll in the Caroline Group. Badly-planted, it is nevertheless an advance on the common practice of planting nuts and seedlings gathered at random.

HUMAN life in the Pacific would become intolerable if there were no coconut palms. On the atolls it would become impossible. Nothing has been found to take its place, and nothing is likely to be found in the foreseeable future.

This dependence of Pacific man on the coconut palm is not primarily a commercial relation. It is a biological necessity. The whole pattern of life is conditioned by it.

Before the cash value of coconut oil was appreciated, before it was discovered that copra travelled better than coconut oil, long before white wheat flour, polished rice, canned meat and white sugar became indispensable foods, the islands supported much larger populations than now, and the needs of the peoples were satisfied by the innumerable products of the coconut palm, by breadfruit, taro, yams, fish and sea-fowl. There was no traffic in coconuts. No one made copra. There was no need to.

In the five years 1935 to 1939, the average annual exports were 225,000 tons, of which New Guinea accounted for 69,300 tons or 30.8%. From the end of 1939 to 1942, the export market was completely disorganized, but the islanders did not starve.

Table I: Copra Exports*

(-000 Tons)

Territory.	Av. 1920-1924	Av. 1925-1929	Av. 1930-1934	Av. 1935-1939	1943	1947	1950	1951	1952
New Guinea	28.0	51.7	61.4	69.3	—	4.4	47.1	64.3	62.4
Papua	5.1	9.6	9.8	10.7	2.4	4.8	10.8	11.2	—
Nauru	(0.1)	0.1	—	—	—	—	—	—	—
Western Samoa	11.7	13.5	10.9	12.5	7.3	18.2	13.9	14.6	—
Cook Islands	1.7	1.8	1.5	1.1	0.5	0.8	1.1	1.3	—
Tokelau Islands	(a)	(a)	(a)	(a)	(a)	0.3	0.2	0.3	—
Niue	(0.5)	0.6	0.2	0.4	0.4	0.7	0.9	0.7	—
Fiji (b)	(19.9)	27.8	20.4	30.6	17.7	27.5	10.2	15.4	12.1
Solomon Islands	13.3	20.7	21.9	21.9	—	0.5	10.1	(a)	—
Gilbert and Ellice	(5.1)	(4.7)	(6.3)	6.3	0.6	6.6	8.4	(a)	—
Tonga	(12.5)	14.3	10.6	11.8	6.6	19.0	16.7	19.2	—
New Caledonia	(2.5)	3.0	2.4	2.7	—	0.8	2.7	2.6	2.0
French Oceania	(12.5)	(13.9)	(18.5)	(21.6)	19.4	20.5	20.4	25.8	24.4
New Hebrides	(5.4)	(9.9)	8.6	11.2	16.1	20.4	21.6	27.7	21.1
Neth. New Guinea	(a)	(a)	(a)	(4.5)	—	0.5	2.9	3.5	3.0
American Samoa	1.3	1.1	0.8	(0.8)	0.1	1.0	1.9	1.0	—
Guam	(a)	(a)	(a)	(2.0)	—	—	—	—	—
Trust Territory of Pacific Islands	(a)	(a)	(a)	(14.0)	—	5.0	8.5	10.5	—
TOTAL	(125.0)	(180.0)	(195.0)	(225.0)	(75.0)	(135.0)	(175.0)	(198.0)	—

NOTES: (a) Statistics not available at time of publication. (b) Recent copra exports from Fiji should be read in conjunction with the following statistics of copra milled for coconut oil production in Fiji: 1947, 11,536 tons; 1950, 18,848 tons; and 1951, 19,847 tons. All figures in brackets are estimates.

* See **Quarterly Bulletin**, Vol. 2, No. 4, October, 1952.

This well-kept plantation on Bougainville Island is an example of post-war rehabilitation of an overgrown plantation. Fallen branches are heaped centrally along the avenues of palms.

The Changing Pattern of Life

The islanders of pre-European days were good agriculturists. They had to be in order to support the large populations of those times. The relics of terrace cultivation of taro in New Caledonia, the abandoned *maités* on the atolls of the Tuamotus, also designed for taro cultivation, the great taro fields of Moorea in the Societies, similar fields in Samoa, the babai (*Cyrtosperma chamissonis*) trenches to be seen in the Gilberts, the bread-fruit culture of the Marquesas, all go to show the ability of the early islanders and their present-day descendants to put their lands to the best use, the cultivation of essential food crops, provided the right incentives are present.

This self-contained economy of the islands, in which the wants of the people were reduced to basic requirements which they themselves were able to produce under their well-knit social organizations, naturally did not involve the concept of commercial barter, nor did it call for money as a means of exchange.

But the picture was changing all the time. During a century of association with the outside world the wants of the islanders have increased. Although food production still remains a major activity, many communities no longer produce all the food they need. This is especially true of the atoll-dwellers, among whom old agricultural arts are rapidly passing, partly because of the enormous labour involved.

Imported foods, easily procurable, have captured the palates of the islanders, but imported foods cost money. Simultaneously, the demands for good housing, improved means of transport, agricultural, health and educational services are increasing, all of which have to be paid for.

Indispensability of Copra

More and more money is required for the good things of life which only money can buy. Copra is money, the only source of money in most islands. So more and more copra is required. But where is it to come from?

The history of copra exports from Pacific island territories over the last thirty years is indicated in Table I.

During the past sixteen months, I have been engaged on a survey of the coconut industry of the Pacific region on behalf of the South Pacific Commission and, with the approval and assistance of the administrations of the respective territories, I have toured New Caledonia, Loyalty Islands, Fiji, Western Samoa, American Samoa, Lower Cook Islands, the islands of the Eastern Carolines and Marshalls, New Hebrides, Society Islands and Tuamotus.

The general picture presented in all these territories is the same, coconut groves and plantations well past their prime, growing old and slowly going out of production, or due to various degrees of neglect, not producing as they ought. Thus, it is not unusual to encounter, on the one hand, palms well over 70 years of age producing an estimated average of 10 to 15 nuts per palm per annum and, on the other, 30 to 40-year old palms producing 20 to 30 nuts per palm per annum. When it is remembered that a 30 to 40-year old palm, with moderate attention, is capable of producing an average of 60 nuts per annum, the unsatisfactory situation can be fully realized.

The average annual copra exports from the Pacific for 1920 to 1924, excluding the Tokelau Islands, Guam and the Trust Territory of the Pacific Islands,

In strong contrast to the clean plantation shown above is this overcrowded, weed-infested, young coconut grove on Uvea Island, Loyalty Group.

A schooner loading copra in French Oceania. The collection of copra, especially from plantations on remote islands and atolls, is a major problem of the industry in the South Pacific.

were 125,000 tons. This figure rose to 225,000 tons (including some 14,000 tons from the Trust Territory) in 1935-1939.

In 1943, after a break due to conditions of war, an export of 75,000 tons was recorded, or one-third the average annual exports in the five years preceding the war. But in that year, exports, if any, from the largest producing island of New Guinea, from the Solomons and New Caledonia were not recorded.

In 1947, the figure rose to 135,000 tons of copra and the oil and meal equivalent of 11,500 tons from Fiji, and in 1951 the quantity exported possibly reached the average before the war.

Complete statistics for 1952 are not yet available, but there has been a drop in exports from a number of territories.

The export of copra is dependent on two factors—desire on the part of the islanders to manufacture it, and availability of shipping. In other words, more copra is made if islanders are assured that ships will come to collect it, but it does not mean that if ships *do* come, the islanders will make sufficient copra from their surplus production of nuts to guarantee full cargoes, although the need for more and more money will increase copra manufacture up to the point when the total surplus production of nuts is absorbed.

The upward tendency in copra exports since the end of the war does not necessarily mean more nuts are being produced in the groves and plantations. The facts of the present situation point the other way. Moreover, the populations in the islands, decimated in the past by wars, pestilences and other causes, are now increasing rapidly under conditions of peace, reinforced by preventive and curative medical services. Increasing numbers of people consume increasing numbers of coconuts from declining yields per palm and per acre year by year. The net result will be an inevitable drop in copra production and, consequently, a dwindling of the islanders' cash incomes at a critical period in their history.

The populations, areas and population densities of Pacific Island territories are shown in Table II (*ex* United Nations Demographic Year Book, 1951).

Table II: Population, Area and Population Densities

Territory.	Population. 1950 Total (-000).	Area. Square Miles.	Population Density. Per Square Mile.
New Guinea (Aust.)	1,071	93,050	11
Papua	369	90,537	4
Nauru	3	8	370
Norfolk Island	1	14	74
New Caledonia	60	7,202	8
French Oceania	60	1,544	39
Netherlands New Guinea	1,018	159,375	7
Western Samoa	79	1,133	70
Cook Islands	15	99	152
Niue	4	100	40
Tokelau Islands	1	4	259
Fiji	289	7,036	41
Solomon Islands	100	11,500	9
Gilbert and Ellice Islands	38	375	101
Pitcairn Island	—	2	67
Guam	59	206	286
Trust Territory of the Pacific Islands (U.S.)	55	830	66
American Samoa	19	73	250
New Hebrides	49	5,700	8
Kingdom of Tonga	47	250	175
	3,337	379,000	8.8

Need for Rehabilitation

There is only one hope—the rehabilitation of coconut cultivation in order to meet future needs. And it must be remembered that the effects of what is done now will last more than fifty years, since the economic life-span of the coconut palm is about 60 years.

The need for rehabilitation is recognized by territorial administrations, and also in many instances by the islanders themselves. A territory-wide rehabilitation programme has been commenced in Fiji and, in a more restricted sense, in Western Samoa. The Government of American Samoa is also engaged in similar plans. It is also worthy of mention that, under the impetus of advice given to them, the people of some islands are setting out on their own initiative to recondition their coconut groves.

Rehabilitation has to be considered in two parts, which are in no way interrelated: regeneration of plantations, and restoration of native groves to full economic production.

Plantation palms are of uniform age, planted in rows, more or less correctly spaced at a 28 to 30-foot planting distance, under one management, whether in single or multiple ownership.

Palms in native groves are usually of uniform age, irregularly planted, badly spaced, under multiple, undivided and

irresponsible ownership and consequently under no proper management at all.

Regeneration of Plantations

Plantations are divisible into those over 60 years of age, and those under.

Regeneration of plantations *over* 60 years of age consists of a partial restoration of soil fertility by the growth of leguminous cover-plants, followed by replanting with selected material and aftercare of transplanted seedlings, principally by the use of artificial fertilizers.

Regeneration of plantations *under* 60 years consists of the adoption of the following cultural practices:

(i) cultivation of the soil and weed control;
(ii) application of mineral fertilizers;
(iii) animal husbandry as a symbiotic arrangement of the greatest economic importance.

Owing to good management and in conditions of responsible ownership, it is easy to plan and execute regenerative measures on plantations.

Restoration of Native Groves

The restoration of native groves to full economic production as an insurance against the future is a much more complicated and much more important task. There are few reliable acreage or production statistics for Pacific territories, but it is safe to say that well over 90% of the land under coconuts is in the ownership of the islanders.

The first problem in the restoration of native groves is not one of replantation. It is the reduction of overcrowding and the creation of a semblance of correct spacing by a judicious thinning out of the stands of palms already present.

The prerequisite to thinning out is an accurate survey of each area to be treated, followed by a census of palms in that area. It will then be possible to calculate, or to estimate with some degree of accuracy, the present concentration of palms of all ages per acre in that area, and also to calculate the maximum number of palms that it could carry at a planting distance of not less than 28 feet.

A full-scale survey of coconut areas in Fiji has been carried out by the Department of Agriculture of that territory, and a somewhat less detailed survey is available for Papua New Guinea.

The next step, after the completion of the survey and census, is to remove all palms over 60 years old. Concurrently, all palms over 50 years but under 60 years should be marked as due for removal at the end of ten years from the date of census.

The third step is to take out all abnormal and unhealthy palms, and palms that are barren for obvious genetic reasons.

The fourth step is to take out all seedlings and young palms under five years, due heed being paid to planting distance. When this is done, the difficulty of not being able to see the wood for the trees will be removed.

The fifth step is to set about the final correction of the planting distance. This has to be a compromise, because straight rows cannot be achieved. But by careful removal of the excess palms with the object of ensuring an *average planting distance* of 28 feet, an uneven straightening out of rows can be accomplished.

While steps 1 to 5 are being worked through, it will be noticed that there are empty places in the groves, which should be filled. On no account must seedlings removed during the thinning out process be used as supplies. For this purpose, only selected seedlings raised from selected seednuts obtained from selected highly-yielding palms must be used.

When native groves have been transformed in this manner, they will require cultivation and weed-control as on plantations. As soils become more and more depleted of phosphorus, nitrogen and potash, due to the continued export of copra, these three ingredients will have to be replaced. This will be assisted by the establishment of the symbiotic nexus between coconut palms, correct surface vegetation and animal husbandry.

Need for Research

Mention has been made already of the relative lack of region-wide statistics on extent and production of coconut palms. There are, for instance, hardly any figures for local consumption. There are also few statistics on age-distribution of palms in the islands.

But above all, what is most deficient is information on soils and fertilizer requirements. Atoll soils in particular need intensive study. For instance, it is surmised that chlorosis of palms on atolls is due to an iron deficiency induced by an excess of calcium. Field experiments have still to be carried out in order to confirm this.

Soil surveys are now under way in certain territories. This work has to be extended to the whole region and hand in hand should go fertilizer trials. In the absence of such research, it is quite impossible to recommend correct fertilizer mixtures.

Need for Technical Advice

The whole programme of rehabilitation will be slowed down or, worse still, improperly put through, if coconut growers are not supplied with continuous technical advice, based on local research and also on research carried out in other coconut regions of the world.

One or two territories can meet this need to a large extent. Many territories are not, however, in a position to add more personnel to their agricultural services or to set up local research stations. These territories will look to the South Pacific Commission for assistance and "clearing-house" information.

Technical advice on all aspects of coconut cultivation is the most urgent requirement in the Pacific. A prosperous coconut industry can pay for all transport, social, medical and educational services required by the islanders.

Ichthyological Study of Raroia Atoll

Ichthyological Field Data on Raroia Atoll, Tuamotu Archipelago, by Robert R. Harry, Atoll Research Bulletin No. 18, 31st July, 1953.

THIS Bulletin contains the first results of ichthyological research work undertaken by Mr. Robert R. Harry, of the expert team which surveyed Raroia atoll in connection with the coral atoll programme of the Pacific Science Board.

This 190-page report, illustrated with several figures and tables, covers an ecological study of the atoll, a systematic account of fishes captured, a description of fishing methods used by the inhabitants, and uses of the fish.

Included in the report is a Raroian vocabulary of fish anatomy, notes on under-water spear-fishing equipment used, and a bibliography.

Hot Weather Housing

Physiological Objectives in Hot Weather Housing, by Prof. Douglas H. K. Lee. Published by the U.S. Housing and Home Finance Agency, June, 1953.

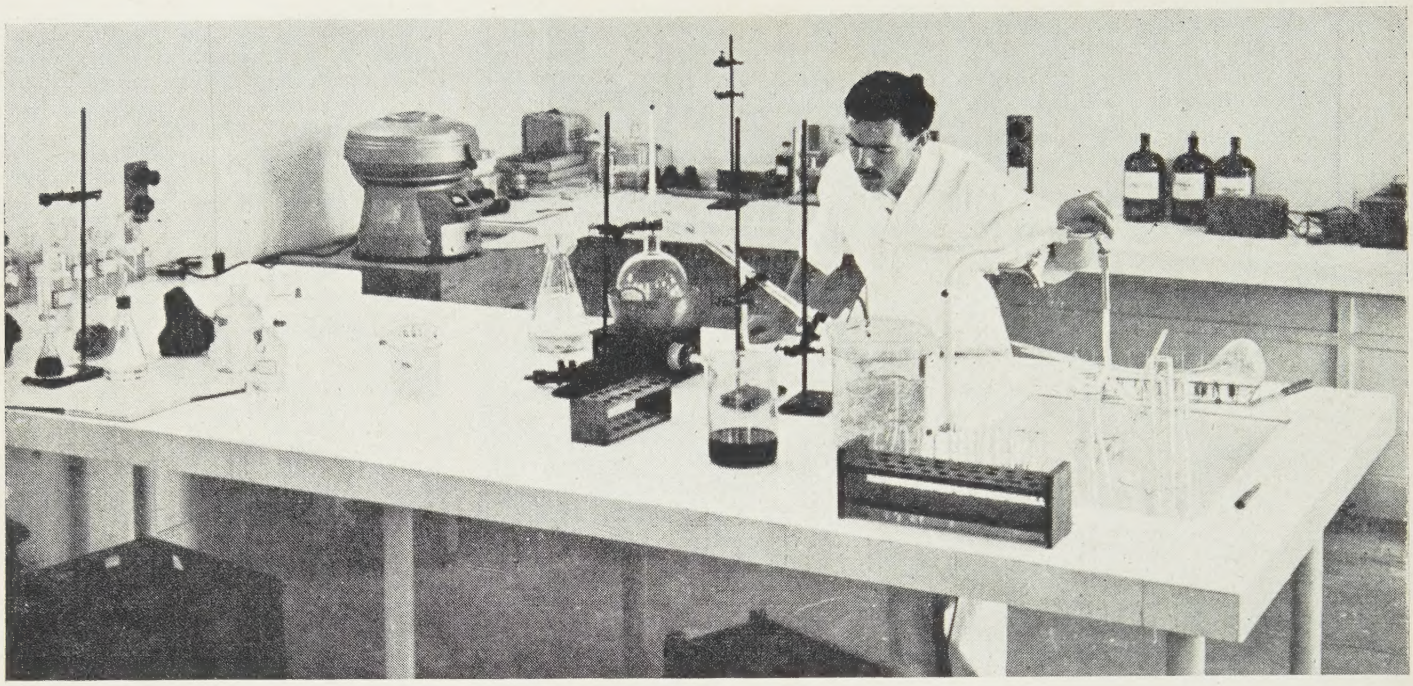
THIS publication is a concise and simply-written treatise on the effects of hot climates on man and the principles which should be adopted in the provision of housing and shelter to minimize the effects of the adverse aspects of such climates.

The need for the human body to lose heat to its surroundings and the channels through which such heat may be lost are outlined to provide a basic understanding of the implications of hot conditions. The discussion which is developed shows how it is possible by the functional design of buildings to reduce the thermal disabilities associated with living in hot climates.

The report is profusely illustrated with photographs and diagrams in explanation of the principles enunciated, and maps are provided to show on a global basis where different types of climate are to be experienced. Charts indicate thermal stresses associated with various levels of activity over a wide range of hot-climate temperatures and humidities.

References are given to other publications which will provide further information on topics within the framework of the present report.

[The above review was contributed by the Commonwealth Experimental Building Station, Ryde, New South Wales, Australia.—EDITOR.]



The Commission's biochemist, Mr. F. Peters, at work in the food analysis laboratory set up in Noumea in premises loaned by French Institute of Oceania.

Analysis Of South Pacific Foods

The Commission has set up a special laboratory in Noumea to analyse Pacific island foods. The reasons for its establishment are explained in the article below.

By FRANK PETERS
Biochemist, South Pacific Commission

SINCE 1950, the Commission has maintained a nutritionist in the field assessing the dietary intakes of South Pacific people. One major problem that has confronted her, however, is the lack of reliable information in the composition of the foods consumed in the area. The need for more concise knowledge on the nutritive value of the foods has long been recognized. This need is being felt now to an increasing degree as the number of nutrition surveys in the area increases, since, for the proper evaluation of the results obtained in a nutrition survey, it is necessary to know the biological values* of the foods being consumed.

The South Pacific Commission now has, as part of its nutrition investigation, a biochemical laboratory in Noumea set up in premises generously loaned by the *Institut Français d'Océanie*. In this laboratory, analyses will be carried out on the many different types of food being used in the South Pacific.

The foods to be analysed fall into two broad divisions, the staple foods like taro, yams, coconut, sago, etc., used throughout the South Pacific, and the other foods which tend to have a restricted geographical distribution but which do play important roles in the diet of the peoples where they grow.

The examination of the staple foods is being carried out also as an adjunct to the subsistence economy survey at present being made in the area by the Commission. A full knowledge of the biological value of the different varieties will be of value in helping to assess which variety would be the best to encourage in a given region.

As the laboratory is situated in New Caledonia, and until a complete technique for the collection, preservation and transport of the food samples can be evolved, the first foods to be examined will be those drawn from New Caledonia and the Loyalty Islands. A start has already been made. Several varieties of taro (*Colocasia antiquorum*, variety "Pui" ordinaire, Taro de Nouvelles-Hébrides, *Xanthosoma* sp.), a yam (*Dioscorea alta*, variety Nouméa blanc court), and several minor foodstuffs, for example, *Hibiscus manihot*, *Wedelia biflora* and one of the mangroves (*Lumnitzera racemosa*) have been examined.

In each food the content of sugars, fats, proteins, minerals, fibre and moisture is determined. Also, each food is being examined to determine its biological value. It has been found, generally, that with vitamins there is no difference between, say, the vitamin C present in oranges and in potatoes — all that is important here is the actual vitamin content. However, comparisons between the biological values of proteins are not so simple. Proteins are made up of combinations of sixteen to twenty amino acids, and different proteins contain these individual amino acids in varying proportions. In the body the proteins are broken down into their individual amino acids, and these may then be used in body processes. It has been found that humans are unable to make for themselves ten of these amino acids, known

* The biological value of a food is a relative value by which foods may be graded according to their importance in any particular diet pattern. Apart from the purely energy providing constituents—carbohydrates (sugars) and fats—the important factors in determining the biological values are the vitamins and proteins.

Mr. Peters examines several specimens of taro (Colocasia antequorum, varieties "Pui" ordinaire) prior to preparing them for analysis.

as "essential" amino acids, and these must therefore be derived from food.

The method of analysis for the amino acids to be employed is that developed in the United States by Dr. Stanford Moore and Dr. W. H. Stein of the Rockefeller Institute for Medical Research. In this method a solution of the food, treated so that the protein is broken down into its amino acids, is passed through a long column of a special resin which is able to hold each amino acid to a differing degree; by adjusting the conditions, the amino acids may be washed off the column in a set order, and may be estimated.

The main advantages of this method are that a complete analysis is obtained —it was formerly quite difficult and tedious to obtain a complete analysis— and it is possible to detect the presence of amino acids and similar substances which one would not expect to be present and so would not normally be looked for.

A very good example of this latter point is some recent work on Cassava (Tapioca or Manioc) from the Belgian Congo, carried out by Professor E. J. Bigwood of the University of Brussels. He found that the actual protein content of Cassava was only about 80% of that previously believed to be present, and that an amino acid, ornithine, made up a considerable proportion of the total amino acid. Ornithine is an amino acid not previously found in foodstuffs, and its presence in a high concentration may lead to a poorer utilization of the other amino acids present. Cassava is now being more widely used throughout the Pacific, and care will have to be taken to ensure that its role in the diet does not increase to the detriment of a food with a higher protein content.

As a result of these analyses, it is hoped eventually to be able to draw up a comprehensive food composition table for all the foodstuffs consumed in the South Pacific, and also to be able to improve a diet, where necessary, by suggesting the use of more nutritious varieties of foods already in use in an area or to be introduced.

Record Fiji Banana Exports

THE total number of cases of bananas shipped from Fiji to New Zealand in 1953 was 383,080, which exceeds by just over 100,000 cases the previous record, established in 1925.

The 1953 shipment was more than double any other annual shipment made during the past 15 years, an achievement all the more remarkable when the damage caused to plantations by the 1952 hurricane is taken into account.

Museum and Art Gallery for Papua and New Guinea

A SPECIAL committee has been appointed by the Administrator of Papua and New Guinea, Mr. D. M. Cleland, to investigate the setting up of a museum, art gallery and public library, prepare an Ordinance to govern such a cultural centre and recommend plans for its establishment and maintenance.

The committee is to be under the chairmanship of Mr. Justice Bignold and will consist of Mr. N. Osborne, Senior Geologist, Australian Petroleum Company; Mr. C. F. Julius, Government Anthropologist; Mr. G. P. Keleny, Department of Agriculture, Secretary of the Scientific Society of Papua and New Guinea; Miss R. Carter, Librarian, Secretary of the Historical Society of Papua and New Guinea; and Miss W. Archer, Department of Education specialist on native arts and crafts.

In announcing the appointment of the committee, Mr. Cleland stressed the need for such an institution, and the widely-felt desire of local residents to see it established—"to safeguard and preserve many things of value and of historic interest in the territory". He hoped it would be closely associated with the recently-founded Historical Society of Papua and New Guinea.

While awaiting the committee's recommendations, Mr. Julius is to act as Honorary Curator of exhibits destined for the future museum, and immediate steps are being taken to collect these from Government departments and residents. As an interim measure they will be housed in offices near Government House that were recently vacated by the Administrator.

Commission Appoints Specialist on Mosquito-Borne Diseases

DR. M. O. T. IYENGAR arrived at Commission headquarters on 8th November to take up his appointment as specialist on mosquito-borne diseases (mainly malaria and filariasis). He will expand the work being carried on to give effect to the recommendations of the conference on filariasis and elephantiasis, held under Commission auspices in Tahiti two years ago.

In recent years Dr. Iyengar has carried out several surveys for W.H.O., mainly on malaria and *Anopheles* in Afghanistan, and on the epidemiology of filariasis in Siam, the Maldives and Ceylon. His duties also included the instruction of local staffs in the study of filariasis in the laboratory and its control in the field.

Dr. Iyengar is a graduate of Madras University. Formerly he worked as an entomologist and malariologist in Bengal and Travancore. The results of his work appear in more than sixty publications.

The opening session of the Eighth Pacific Science Congress, held at the University of the Philippines, Quezon City.

Eighth Pacific Science Congress

Four hundred scientists drawn from the countries bordering the Pacific Ocean assembled in Manila during 16th to 28th November last for the Eighth Pacific Science Congress.

THE importance attached by the South Pacific Commission to this Congress was indicated by its decision to be represented by its four principal technical officers: Dr. E. M. Ojala (Deputy Chairman, Research Council), Dr. E. Massal (Health), Dr. A. H. J. Kroon (Economic Development) and Mr. H. E. Maude (Social Development). Representatives were present from the Trust Territory of the Pacific Islands and Netherlands New Guinea, while the Australian delegation included a veterinary officer from the Department of Territories, Canberra.

The following papers prepared by Commission officers were presented in various divisions of the Congress by the Commission representatives:

The Work of the South Pacific Commission in Health, Economic and Social Development: by Dr. E. M. Ojala, Deputy Chairman of the Research Council.

Some Aspects of Fisheries Development in the Area of the South Pacific Commission: by Dr. A. H. J. Kroon, Executive Officer for Economic Development.

Rehabilitation of the Coconut Industry in the South Pacific: by Mr. W. V. D. Pieris, Technical Officer, Copra.

The Rhinoceros Beetle as a Regional Problem in the South Pacific: by Mr. L. J. Dumbleton, Plant and Animal Quarantine Officer.

Present-day Problems in the Utilization of Pasture Land in New Caledonia: by Monsieur J. Barrau, Technical Officer.

Filariasis Bancrofti in New Caledonia: by Dr. E. Massal, Executive Officer for Health.

Rural Community Projects in the South Pacific: by Mr. H. E. Maude, Executive Officer for Social Development.

The Social Sciences and Applied Anthropology in the South Pacific: by Mr. H. E. Maude, Executive Officer for Social Development.

Although not much of the time of the Congress was devoted to discussion of subjects of direct interest to the Pacific Islands, the exchange of views and experience enabled the Commission's work programme to be seen against the broader background of the research and development being undertaken in the whole Pacific region.

The contracts made with Departments of the Government of the Philippines proved stimulating, because many problems found in the Pacific islands are being dealt with in the development programme of that country.

Chemical and technological studies relating to the uses of the coconut and its products, and the mechanization of handcrafts production in the villages were particularly interesting features. These will be reported in subsequent issues of the *Quarterly Bulletin*.

Yaws Eradication in Western Samoa

DR. R. HUGGINS, of the World Health Organization's regional office in Manila, adviser on treponematoses and venereal diseases, visited Western Samoa in November-December to study, with the health service of that territory, the possibility of conducting a yaws eradication campaign by means of repository penicillin (P.A.M.).

On his way back to Manila, Dr. Huggins called at Noumea for discussions with health officers.

South Pacific Rice Survey

To foster the expansion of cash and subsistence crops in South Pacific territories is a major objective in the Commission's work programme. Below is a brief account of a survey of the rice industry in the area, now being undertaken for the Commission by Mr. R. Watson, of the Food and Agriculture Organization.

Mr. Watson (left) discusses wet land rice cultivation at St. Louis Mission, near Noumea, with Dr. Alex Kroon, who is in charge of the Commission's economic development programme. The young rice has just been transplanted.

THE possibilities of expanding rice production in selected South Pacific territories are now being examined by Mr. R. Watson, an expert of many years' experience in rice production and marketing in Burma and East Africa. His services were made available to the Commission for the purpose by the Food and Agriculture Organization.

Mr. Watson arrived in Noumea in December to begin his survey in New Caledonia. He will also visit Fiji, Papua and New Guinea, British Solomon Islands Protectorate, Netherlands New Guinea and possibly the New Hebrides. In each territory Mr. Watson will study rice production and potential rice-growing areas with a view to recommending action for increasing production. His investigations are expected to take about four months

This survey has been arranged by the Commission because it considers rice production in the area can be expanded to make a more significant contribution to needs that are growing as rice becomes more popularly accepted in the region as a staple item of diet.

With the exception of Fiji, rice production in South Pacific territories is negligible, as figures in the accompanying table show. They also reveal imports totalling approximately 26,000 tons yearly are needed.

In some of the territories Mr. Watson will visit, steps are already being taken to expand production, as for example the Mekeo scheme in Papua and New Guinea, the Nimboran development project in Netherlands New Guinea, and the investigations being carried out by the Fiji Department of Agriculture.

In none of these territories is further development limited by lack of land. While technological problems are at present a limiting factor, these might be solved in the South Pacific by the application of new mechanical techniques in use elsewhere.

Imports and Local Production of Rice in South Pacific Territories

Territory.	Imports		Production	
	Year	Quantity (Tons)	Year	Quantity (Tons)
American Samoa	1951	100	—	—
Fiji	1952	993	1950	18,250
French Oceania	1952	1,524	—	—
Gilbert and Ellice Islands	1950	548	—	—
New Caledonia	1952	2,688	1952	27
New Hebrides	1952	2,073	—	—
New Guinea	1952	7,386	1953	300
Papua	1953	3,908	1951	184
Solomon Islands	1950	1,359	—	—
Western Samoa	1952	650	—	—
Netherlands New Guinea	1952	6,043	1952	300

Grazing on the best pasture at night is a management practice that assists in ameliorating a tropical climatic environment. These photographs show cows from the same herd at Sigatoka.

That on the left was taken in bright sunshine at 11.30 a.m. on 27th July last, when the ambient air temperature was 74° F. It will be noted that the cows are not grazing. The second photograph (right) was taken at night, at 10 p.m. on 26th July, when the ambient air temperature was 68° F. Almost all the cows are up and grazing.

It should be noted that as the first photograph was taken in mid-winter, the day-time temperature was not high by tropical standards.

Dairy Stock Productivity Under Tropical Conditions

W. J. A. PAYNE

Animal Husbandry Officer, Department of Agriculture, Sigatoka, Fiji

*This article describes an experiment to compare indoor and outdoor management and feeding of dairy cattle in the tropics, being undertaken by the Department of Agriculture, Fiji, with grant-in-aid assistance from the Commission. It follows the climatic studies on identical twin heifers conducted jointly by the Departments of Agriculture, Fiji, and New Zealand. (An account of this experiment appeared in the "Quarterly Bulletin" for October, 1951.)**

THE productivity of dairy stock in the tropics is closely controlled by physiological factors that may not be directly related to their inherited capacity to produce, even if they are well fed and managed by normally-accepted standards and are free from diseases and parasites, both internal and external. The reason for this is that productive processes such as growth, or milk and butterfat production, produce surplus heat of which the animal may have difficulty in disposing, and there are large differences, both within and between breeds, in the ability of different animals to dispose of this surplus heat. An animal that can do so without reducing its productivity is said to be heat tolerant. This characteristic obviously depends upon a large number of factors, some of which are inherited, and some of which can be altered by changes in the environment.

A dairy cow can be studied in the same way as a machine with regard to thermal exchanges between itself and its environment, and the aim of good management of dairy stock in the tropics should be to take all economically justifiable measures that will decrease the total heat load of the animal, or help to spread it evenly over the twenty-four hours.

It is probable that tropical conditions can be ameliorated by special management practices. It would appear in the light of present knowledge that practices that help to reduce the heat load or to spread it more evenly are: (*a*) the provision of rations that do not exceed optimal requirements, particularly with regard to protein and fibre; (*b*) the permitting of grazing only at night and not during the day, concentrating feeding during the early morning or late afternoon; (*c*) the provision of an adequate water supply, both in the yards and on the grazings; (*d*) the provision of natural or constructed shelter, both in the yards and out on the grazings; (*e*) the selection of suitable materials for shelter construction; (*f*) the siting of yards, bails, and shelters so that they are open to the prevailing winds; (*g*) the clipping of the coats of animals that are to be sheltered from solar radiation during the daytime; (*h*) the planning of a breeding programme so that the animals calf down and reach their maximum milk production in the coolest season (if seasonal milk production is not economically undesirable); and (*i*) the provision of water sprays, forced air fans, and a cooled water supply in the yards, bails, and shelters, if the use of these practices can be economically justified.

A system that could combine many of these desirable managerial practices is indoor feeding and management through-

* For a general discussion of the problems associated with animal production in the South Pacific, with special reference to cattle, readers are referred to the article which appeared in the **Quarterly Bulletin** of April, 1953, Vol. 3, No. 2. - EDITOR.

out the life of the animal. The disadvantages are the high capital cost of buildings and equipment, and the possibility that the additional cost of carting feed to the animals and manure to the fields will not be fully compensated for by any increased productivity. There is also the additional disadvantage that pastures are more difficult to manage if they are only cut and not grazed.

It would appear, however, that the desirability of some of the above management practices should be investigated, and an experiment has therefore been designed to compare indoor and outdoor feeding and management practices, using European-type identical twin dairy stock, with particular reference to the effects on growth, milk production, fertility, and the effective cost and profitability of the two systems. The experiment will be conducted at the Agricultural Station, Sigatoka, Fiji, where the erection of the necessary building to house the animals and other preparatory work has already been completed.

Eight sets of identical twins from the Ruakura Animal Research Station in New Zealand were ordered, and were to have arrived in September last. Unfortunately, due to an outbreak in New Zealand of a disease known as leptospirosis, it has been impossible to import the twin sets and to commence the experiment in 1953. It is hoped that importations of cattle can begin again from New Zealand as soon as the outbreak is under control, but it will not be possible to import the twin sets until September, 1954, as the New Zealand calf drop is seasonal.

The duration of the experiment will depend upon the number of twin sets surviving, but it is anticipated that it should run for a minimum of three years, or until less than five twin sets remain.

The experimental details are as follows. Eight animals, one from each set, will be housed all their productive life in yards constructed to give ample shade and natural ventilation, and with provision for water sprays and forced air draught. The other eight will be fed and managed in exactly the same way as the station dairy herd, that is, outdoors except for a short period during the first two months of life.

The indoor group will be fed on fodder cut from the fields in which the outdoor group is grazing. The manure from the yards will be used to fertilize fodder grasses, and comparisons will be made between manured and unmanured plots.

Observations on both sets of animals will comprise measurements of feed intake, growth, milk and butterfat production, reproductive behaviour, general health, body and skin temperatures and respiration rates, chemical composition of the feeds, and a complete financial costing of all operations.

As the major experiment cannot commence this year, interim investigations will be conducted, using sets of adult twin cows, on the effect of shade and water spraying on productivity, and on intake differences between cows managed indoors and outdoors.

Agrarian Development of Netherlands New Guinea

PROPOSALS for the agrarian development of Netherlands New Guinea will be put forward in February, when the report of the advisory commission which visited the territory in August and September last year, is issued.

The commission comprised an agronomist, agricultural economist, and experts on forestry, livestock and mechanized agriculture. Its terms of reference included investigations into the possibilities of agrarian development in general, taking into account existing social and economic conditions. Special attention was to be paid to assessing the possibilities, firstly, of the territory becoming self-supporting in respect of basic foodstuffs and, secondly, of the establishment of an industry for processing locally-produced foods.

The commission's task was an exceptionally difficult one in that development of Netherlands New Guinea is hampered by the vast coastal swamps, the mountainous, inaccessible hinterland, soils that are mainly infertile, and a sparse, backward native population.

[An article embodying the main findings of the Commission's report will be published in the April *Quarterly Bulletin*.—EDITOR.]

New Fiji Farm Institute will Open in February

AT a cost of about £9,300 from Colony funds, a new Farm Institute has been built at the Koronivia Agricultural Station, near Suva. This was one of the schemes in the Colony's ten-year development plan.

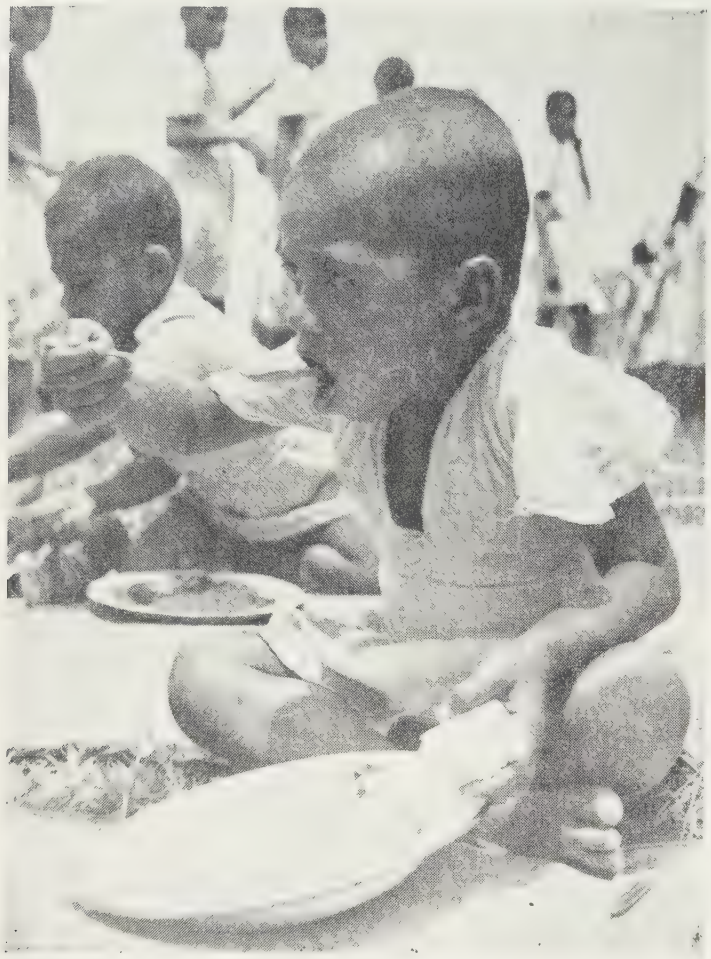
The new Institute's first session will open in February, when a two-year course covering all aspects of agriculture is begun. Subjects will include animal husbandry, horticulture, crop husbandry and farm management.

A syllabus of lectures and demonstrations has been drawn up, and these will be given by the various specialist officers of the Department of Agriculture. Particular emphasis is placed on practical work, and students will spend almost three-quarters of their time in the field.

The very wide range of farming activities normally carried on at Koronivia will ensure that students will have ample opportunity to become familiar with all branches of practical agriculture.

Accommodation for students at the Farm Institute is limited to twenty. Since the course is a two-year one and annual recruitment is essential to ensure continuity, only half that number can be enrolled in any one year.

The Role Of Education In The Improvement Of



Health In The South Pacific

LYNFORD L. KEYES
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Regional Adviser for Health Education of the Public,
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World Health Organization

Food habits, like all other health habits, can be changed through the proper educational approach . . . for adults as well as children.
-- Fiji Official Photo.

THE health problems in the islands of the South Pacific can be predominantly identified with those of rural living. Unlike urban areas where there is usually a concentration (although not always adequate) of medical and health services, and where a relatively few health personnel can provide mass disease control through adequate water purification and sewage disposal facilities, rural areas are faced with the need for the people themselves to take actions necessary to break the chain of disease transmission among themselves.

Examples of these actions are: the building and use of sanitary privies; using safe water which may be some distance from the home when river water is at the back door; seeing that tuberculosis cases sleep in different rooms from the other members of the family; learning to grow and use the most nutritious of their native foods, and keeping domestic animals and cattle tied or penned and away from the home. There are many others.

No reasonable number of health and medical personnel in any particular community can ever cope adequately with its health problems until people's health attitudes and habits improve and they are willing to work together for their collective health. Regardless of how poor a village may be, there are always actions which, if taken by the people, will improve both individual and community health.

Education Means Change

Such actions are best accomplished through an educational approach — education being evidenced by the changes in the behaviour and habits of the people. It would be erroneous to assume that this type of education could be accomplished through a purely information approach, such as lectures, campaigns, radio films, pamphlets, posters and the like. In this regard there is a considerable amount of accumulated practical evidence from different parts of the world to support this view.

Information Not Enough

Let us take an example from the field of environmental sanitation. There are many instances on record where water supplies and waste disposal facilities have been provided for people in certain rural villages, together with extensive information campaigns about their proper use, supported of course by "germ theory" reasons. Yet, to the surprise of many, the dismay of others, and even the rage of other outsiders who had worked very hard to make these facilities possible, the people gradually reverted to their former habits.

In some instances this took place rather slowly, because the people were sometimes afraid to disobey the regulations prescribed by the outsiders. In other instances, the people had great respect for and awe of the outsiders. The indigenous people in these pilot projects soon learned, for instance, how much the matter of cleanliness meant to the outsiders. They observed the great amount of hand washing, bathing, and care in the excreta disposal. This impressed the local people because they saw in it a ritual and ceremony which they could identify with some of their religious procedures. Thus we can

Every community, regardless of its stage of development, can by itself do a great deal to improve its health.

imagine that the "fetish" of cleanliness brought by the outsiders was respected in many instances by the local people to the extent that they even went through the motions themselves, but, of course, understood very little about the reasons behind their actions.

Return to Old Ways

However, whether the motivation was fear, respect or admiration, as time went on the privies were used less and less (if they ever had been used at all). Sometimes they were considered such excellent structures by the people that they were used as store houses, tool sheds, or even extra rooms for the home. The water facilities, too, gradually fell into disrepair, and because of the lack of extra parts or the lack of skill in their maintenance, the people again used the nearby streams or old open wells. Of course, the incidence of intestinal diseases rose, as did the mortality rates, but the local people did not understand or keep statistics. Some lived and some died, and the causes still were as much a part of the village superstition pattern as they ever had been.

We in no way wish to imply that any indigenous people have been underestimated. Neither should we conclude that progress in rural sanitation has not been made. Quite the contrary, great achievements *have* been made. The most significant conclusion which can be drawn from this example is that *people do not alter their health habits and behaviour simply by being given information and the proper tools or facilities for the improvement of their lives.*

Integrated Change the Cornerstone

The most desirable and lasting changes in all people come about when they feel a need for change, understand why the change is necessary, and are themselves involved in the planning and decision-making for this change — either as individuals or in communities.

Any health worker or other individual who is interested in the improvement of health in rural areas needs to understand and apply the principles of changing human behaviour. Before action is taken in this direction, it should also be remembered that improvement in health must keep pace with the educational, economic, agricultural and other changes necessary for full community development. When any particular problem area, such as health, is pushed ahead of others, it ultimately suffers setbacks and may even endanger solid or total community improvement.

During the past half-century gigantic strides have been made in the medical and public health sciences. It has been suggested that if all that is known about health could be applied, man would come close to achieving the health that is "a state of complete physical, mental and social wellbeing, and not merely the absence of disease and infirmity". No area in the world has been able to approximate even closely such achievement. The failure lies in the inability of health workers adequately to utilize the behaviour sciences so that desirable health habits are practised. Thus most effectively to improve health—rural or urban—the appropriate application of the sciences of human behaviour emerge as being as essential as knowledge and use of the medical and public health sciences.

Involvement of People Necessary

Those leaders who are interested in improving rural health must work with —plan with—the people if lasting and significant accomplishments are to be realized. The planning with—rather than for—approach involves the application of certain principles and understandings about the way people learn and change. In some instances, specialists in this type of work—health educators —may be called upon for assistance in the development of the health programme.

This does not mean, however, that those interested in rural health must wait for the assistance of a health educator. Definite steps can be taken in the planning for and carrying out of health improvements in rural areas. The following suggestions are offered as guideposts to planning and action. They have emerged from the experiences of health educators and fundamental education specialists in applying some of the principles of the behaviour sciences. Needless to say, these guideposts can be used with equal success in any type of community improvement work.

Guide Posts to Action

As a prelude to planning, certain essential facts about the people to be changed must be gathered. It is not always necessary that just a few people gather this information. Instead, con-

siderable impetus will be given to any programme if, through a self-survey or study, the people discover answers to as many of these questions as possible for themselves.

- — What problems do the people recognize and have an interest in doing something about?
- — What information do they already have about these problems?
- — What do they perceive as the cause and possible solutions?
- — What are the usual channels of communication in which the people have confidence?
- — What are the social, economic, cultural and religious characteristics of the people—their value systems, customs, beliefs and ways of working? What action do they take?
- — What resources exist in the community that can contribute to any educational programme?

Helping People to Discover Problems

Health changes in a community can be effective only if there is a strong desire for change, improvement and progress on the part of the people themselves. The first step, then, is to stimulate the people to realize the existence of their own deficiencies, and that it is in their power to bring about improvement by their own efforts. Sometimes, for exampe, people are quite unaware that they are malnourished, and that as a result of malnutrition their vitality is being sapped. Here, a self-survey might produce quite dramatic results.

Utilization of Natural Leaders

It is not within the scope of this paper to outline the actual educational techniques for bringing about this awareness and feeling for need of improvement, but it is important for the person who would bring about change to concentrate on the natural leaders in a community. If they can be recognized—and they are not always the official leaders—and won over, they will give guidance to subsequent things that the people may do. In fact, their influence is so great that they have sometimes been called the "gate-keepers" to action.

Broad Participation Essential

Having created this awareness, the next step is to plan what action is to be taken to achieve the desired ends. In this step, there must be broad participation on the part of the people. This is emphasized because social scientists have found that when people have a part in studying and planning the ways in which they will solve a problem, they are much more likely to carry out the planned action.

Preconceived Plans Undesirable

At this stage, a leader should act as a consultant and resist the temptation to foist his own ideas on the people. He should, nevertheless, know the potentialities of the area and the people, and be familiar enough with the problem under consideration to be able to help the people understand it, as well as to help them see ways by which it can best be solved to their own advantage. It cannot be too strongly emphasized that preconceived plans, no matter how sound they may be in themselves, are unlikely to be accepted by the people or, if accepted, will not be given active support.

Limits to Decision Making

There is an important part of planning which is frequently overlooked, and which confuses and discourages many leaders and administrators from involving wider participation of the people. There are always a number of ways of achieving goals or solving problems which people may choose. There are also many non-technical decisions which can be left entirely to them. There are many decisions, however, which cannot be left to them. Such decisions are those prescribed by medical and public health science. For example, whether tuberculosis is caught from a person who has it, or inherited, is not a question to be decided by the people. Science has proven that the control of this disease requires breaking the chain between the sick person and the well person.

However, there are a variety of ways in which various control methods can be realized. A wise public health worker will advise on the technical aspects of achieving this control, but will leave to the people the kinds of decisions which, although technically unimportant, are important to their ultimate actions. For example, whether privies are built with or without risers is unimportant to the technician. Incidentally, situations have been reported where privies with seats were built for the people and none of the people would use them since they preferred privies over which they could squat.

In the educational phase of any health programme, almost all of the questions about methods to spread information and secure action can be decided most effectively by the people. The leader or technical expert must take responsibility for the technical accuracy of this information. He may also advise on methods based on his previous experiences, but final decisions should be left with the people.

Programme Should Be the People's

Having decided on a plan, the people should as far as possible be given control and responsibility for its success or failure. People will, however, feel more responsible if they make some contribution in time and effort as well as cost towards the project. The cost can be minimized, but should be made. In this way people feel that it is their own programme rather than a present or a plan from the government.

Evaluation

The last step is for the leader to help the people evaluate the project or programme which they undertake. Progress will need to be measured in terms of the active goals of the project. Care must be taken not to be misled into thinking that because target dates are met and other objective results obtained, lasting improvement in the health behaviour of the people has been achieved. As encouraging and inspiring as these tangible achievements may be, the real test of accomplishment is whether the people are increasing in their acceptance of responsibility for setting their goals, putting into practice the technical information they have learned, and whether they have an increasing desire to take other actions for the improvement of their health and welfare.

Conclusion

The educational approach suggested above is a dynamic one which recognizes the importance of an individual's attitudes, and those of the group to which he belongs, in controlling his behaviour. This is more than information giving. It considers the individual's past experience, the information which he already has, and what he expects in life.

Such an approach also recognizes the effect of the customs and beliefs of the people, and the part the community plays in determining what behaviour is socially acceptable for a given individual. This kind of educational approach to the solution to problems in rural health is calculated to produce lasting results by which the people themselves can justly say—"see what we ourselves have done".

Collection and Preservation of Manuscripts

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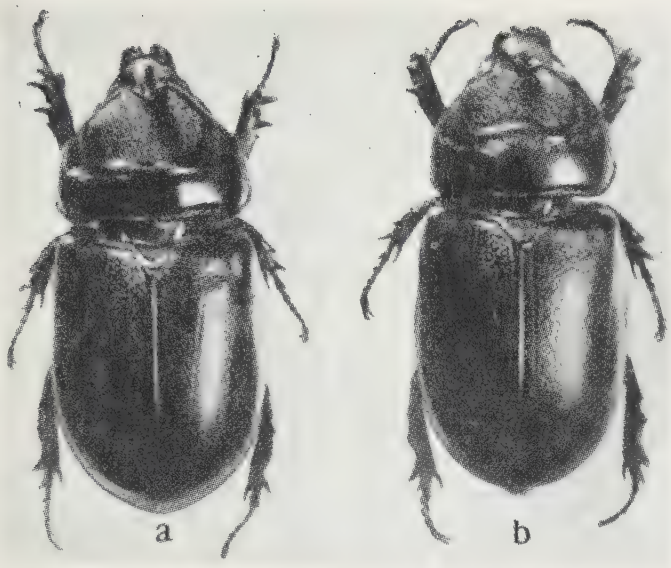
The following manuscript has been made available for deposit and reproduction by kind permission of M. J. C. Guiart, Ethnologist, Institut Français d'Océanie, Nouméa, New Caledonia:—

Anonymous: *Elements de Grammaire Wallisienne.* 76 p. *Ts.*

Microfilm positives of the above document may be obtained at a cost of 6/- (Australian currency) on application to the Executive Officer for Social Development, Box 5254, G.P.O., Sydney, N.S.W., Australia.



Dorsal and lateral views of the adult beetle (a, male; b, female). The full-grown beetle is from 1½" to 2" long.

The Coconut Rhinoceros Beetle

(Oryctes rhinoceros)

THE COCONUT RHINOCEROS BEETLE (Oryctes Rhinoceros). With Particular Reference to the Palau Islands. Berenice P. Bishop Museum Bulletin 212, pp. i-viii and 1-157, 50 figures, Honolulu, 1953, $2.50.

A review of a recently-issued report on the major pest on coconuts in the South Pacific, the rhinoceros beetle, contributed by . . .

L. J. DUMBLETON

Plant and Animal Quarantine Officer,
South Pacific Commission

THE interest and apprehension aroused by the recent establishment of the rhinoceros beetle in Tonga and Fiji makes the appearance of this publication by Dr. Gressitt both welcome and timely.

The main concern of the organizations which sponsored and paid for the work carried out by Dr. Gressitt, and for the publication of this report, was with the rhinoceros beetle problem in the Palau Islands in the Caroline group, United States Trust Territory.

The report covers Dr. Gressitt's work in the Palaus in the latter half of 1951, and his supplementary observations in Western Samoa and American Samoa. Insofar as the rapid growth of beetle populations in the Palaus had its origin in the abundance of palms killed and damaged during the war, conditions there were similar to those in New Britain In other respects, however, the conditions in the Palaus are more like those in the oceanic islands of the Pacific.

The description of the spread of the beetle through the Palaus is most interesting. It is thought to have established itself in the small, central island of Koror in 1942. In five or six years it had spread to Peleliu Island, 25 miles to the south, and Angaur, 40 miles south, throughout the large island to the north, Babelthuap, and to Kayangel Atoll, 20 miles north of Babelthuap.

In Angaur (which before the war had about 6,000 palms) and on Peleliu, Koror, Arakabesan and Malakal, bearing palms were practically eliminated, and of 1,000 palms planted in Peleliu in 1951, one-third were killed by the beetle within six months.

One of the most interesting of Dr. Gressitt's findings is that on several of the islands the beetle was feeding on and breeding in *Pandanus*.

While it is difficult to get comparable estimates of damage, Dr. Gressitt estimates a 50 per cent. mortality of palms in ten years in the Palaus as against a 15 per cent. mortality over forty years in Western Samoa. Losses in American Samoa are believed to be lower. Outside the Pacific no estimates of losses are given except for East Africa, when the losses (due to a different species of *Oryctes*) are given as 2 per cent. over a few years.

The description of the insects and other animals associated with the beetle in the places where it breeds, whether as competitors or predators, is valuable for the purposes of comparison with conditions in the continental areas where the beetles exist, and where search must be made for possible parasites or predators.

Apart from the author's observations in the Pacific, the *Bulletin* contains an up-to-date review of all aspects of the rhinoceros beetle problem as it exists in all areas throughout the world where the beetle is present. This is particularly valuable in view of the fact that the 300 papers included in the list of references are scattered in many journals in several languages. The older works especially are often difficult to obtain.

Excellent photographs and sketches supplement the technical descriptions of all stages of the insect and of the mode of working of the beetle in the palm crowns.

The elucidation of the factors which govern the behaviour of the beetle still demands prolonged and patient experimentation and analysis, and the search in other areas for effective parasites, predators and diseases must continue. Not the least of the merits of Dr. Gressitt's paper is that it puts all these aspects of the problem in their proper perspective.

Sun-drying copra in Fiji on running trays, with provision for rain protection.
— Fiji Official Photo.

Observations On

Copra Drying And Copra Dryers

A review of a report prepared by W. J. Blackie, Deputy Director, Department of Agriculture, Fiji.

Observations on Copra Drying and Copra Dryers, by W. J. Blackie, M.Sc., F.R.I.C., F.N.Z.I.C. (Mem. Soc. Pub. Analysts), Deputy Director of Agriculture. Department of Agriculture, Fiji, Bulletin No. 25. 14 p., 8 plates. Government Press, Suva, Fiji.

DR. BLACKIE'S observations on copra drying and copra dryers cover the general problem of copra drying, the main systems developed for dehydration of copra, types of kilns, the problems with special reference to Fiji, immediate recommendations regarding suitable types of kilns, and recommendations regarding future investigations and action to secure improvement in quality.

In the chapter on the general problem of copra drying, it is stated that the experimental work carried out in Fiji has shown that copra deteriorates rapidly and loses considerable actual weight, due to mould damage, unless it is dried rapidly to below 8% water content. It is this fact, and the improvements in plantation practices, that call for efficient drying machinery, and *not* the prevention of the development of free fatty acid and other impurities, which can be removed for a few shillings per ton.

Where weather conditions are favourable, sun drying is a cheap process that produces good quality copra. If there is too much rain, good copra can be obtained only by means of artificial dryers.

The author classifies the existing kilns as follows:

Hot Air Dryers — Natural Draught: open combustion system; closed combustion system; steam heated.

Hot Air Dryers — Artificial Draught: forced: vacuum.

The study of the various systems of drying copra, and of various types of kilns, leads Dr. Blackie to make the following recommendations.

For production of around 150 tons per annum, Chula Natural Draught Dryers VND or NDO, Moody's Dryer, or a similar modification of the German-New Guinea type (such as are in use on two plantations in Tonga) would be suitable. For quantities of about 250 tons, the larger models of the Chula dryer such as NDO and BDN1 could be used.

For quantities of copra around 300 tons, either a larger model of the German-New Guinea type or Chula model BDO would meet requirements. When production exceeds 400 tons per annum, the Chula BD1 model should be installed.

For the drying of smaller quantities of about 80 tons per annum, the author recommends the Chula ND1 as a very suitable dryer. He estimates that such a dryer, which can be constructed for approximately £F.500, would be economic on holdings down to 45 tons annual output.

In his recommendations regarding future investigations, the author favours a special campaign to promote the establishment of good vatas in less humid areas, and dryers in those that are more humid.

Furthermore, he considers that legislation to control copra quality should eventually be introduced, when, through purposeful propaganda, the need for dryers has become fully realized and accepted by growers.—A.H.K.

Surveys of Eye Diseases

BRIEF surveys of eye diseases prevalent in the territories of Niue, American Samoa and Western Samoa are being carried out for the Commission by Dr. J. J. Loschdorfer, ophthalmologist of the administration of Papua and New Guinea, who arrived at Commission headquarters on 3rd November. Dr. Loschdorfer's services were made available by his administration to the Commission, which had received requests for the services of an eye specialist from the territories named.

Dr. Loschdorfer's main task in each territory will be to carry out a survey of eye diseases and causes of blindness, to advise local hospital staffs on the diagnosis, treatment and prevention of eye diseases, and to carry out operative treatment on advanced cataract cases. In Niue he will assist in setting up a service to provide glasses for people needing them.

Dr. Loschdorfer left Commission headquarters for Niue on 6th November.

Commercial Relations In The Pacific Islands

A review of a report prepared for the Commission by Mr. V. D. Stace, Assistant Economist to the Reserve Bank of New Zealand.

By A. J. L. CATT*

The chairman of the Tauri River Natives' Society addresses a general meeting held outside the Society's store. Seated at the table is the Co-operatives Officer.

FROM its inception, the South Pacific Commission has recognized that a major problem of the area is the dearth of credit facilities suitable to the needs of the indigenous inhabitants. Thus, in its first report the Research Council stressed — "the importance of specially adapted monetary and credit systems in the development of agricultural, industrial and commercial enterprise by the indigenous population", and recommended—"as an aid to further examination of the subject by the Research Council . . . that the Commission invite its members to provide the Secretary-General with details of monetary systems and credit facilities now operating in their non-self-governing territories, together with any comment on their significance in developing native enterprises the appropriate authorities may care to make".

This recommendation was endorsed by the Commission, and in 1950 a comprehensive survey to be carried out by correspondence was organized within the Secretariat. Questionnaires were sent to the various territories and to the banks in the area, and some very complete replies were received. However, some gaps still remained and, more important it was found difficult to integrate the individual territorial statements into a regional analysis of the available credit facilities in relation to the needs of the indigenous inhabitants.

Accordingly, the Commission decided to engage an experienced economist to travel through the area and report. The economist engaged was Mr. V. D. Stace, Assistant Economist at the Reserve Bank of New Zealand. Mr. Stace was well fitted for this task, for as well as being highly experienced in the practice and theory of money and banking, he had a little earlier carried out an investigation into the currency and foreign exchange system of Western Samoa. The Reserve Bank of New Zealand was prepared to co-operate, and not only released Mr. Stace for this work, but also contributed towards the expenses. The Commonwealth Bank of Australia also evinced interest, releasing Mr. Peter Carne, a former branch manager of the Bank in New Guinea, to assist Mr. Stace.

Although they were not able to go to every territory in the region in the short period of four months at their disposal, a wide area was covered, Fiji, American and Western Samoa, Papua and New Guinea, including New Britain and New Ireland, Netherlands New Guinea and New Caledonia, all being visited.

The report of the survey was, in its main findings, endorsed by the Commission, which also recommended it to member governments.**

Socio-Economic Approach

Perhaps its most important feature is the socio-economic approach adopted. Mr. Stace has looked further into the problem than merely examining the existing state of commercial relations, and he has been at pains to emphasize that the provision of credit facilities is not sufficient if the people do not understand them or recognize their importance. This he found to be the position in most of the territories visited, and as a result, one of his basic conclusions is that education in commercial matters is essential if the islanders are to avail themselves of better facilities as they are provided. Experience in American Samoa has shown that with the appropriate training, including actual experience with commercial techniques, Pacific Islanders have the ability to make use of credit facilities, and also to provide them. But the training must be of a practical kind, and Mr. Stace suggests that co-operatives are the best means of providing it.

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* Mr. Catt was recently appointed Technical Assistant to the Deputy Chairman, Research Council. He was formerly a member of the research staff of the Reserve Bank of New Zealand.

** The Stace Report will shortly be issued by the Commission in its Technical Paper series. EDITOR

In addition to the islanders' lack of understanding of a money economy, their communal system of society needs to be modified in some respects before full use of improved facilities by the islanders will be possible. Mr. Stace sees co-operatives as a very promising influence in this direction also, since they enable industry on the part of individuals to be rewarded more directly than would be the case under normal village custom. Also important is the fact that as co-operatives fit in well with the traditional way of life of the islanders, they are therefore not a violently disruptive influence in the anthropological sense.

Fortunately the lack of credit facilities and the inability of the islanders to use them is not, according to Mr. Stace, a serious disadvantage at present. In their present stage of commercial development there is a limit in most parts of the Pacific to the amount of capital they could usefully employ. This limit, initially at least, appears to be within their own capabilities as savers when the incentive is there. In the Pacific generally, the limiting factor at present is not cash and crèdit; rather it is the general lack of understanding of the importance and methods of investment.

In this connexion, too, co-operatives can play an important part. For example, in the Gilberts, the islanders through their co-operatives have recognized this importance, and as a result are willing to receive only 30 per cent .of the total copra receipts. A considerable part of the remainder goes in costs, commissions and taxes, but much is saved and invested. Thus, as at 31st December, 1950, a stabilization fund sufficient to subsidize copra production at the rate of £10 a ton for four years had been built up, and the co-operative owned two 60-foot motor vessels, six sailing ships, three launches, three punts, seven lorries, and docks, warehouses and other miscellaneous equipment. Nearly all of this had been achieved over a period of three years in an area where the population was about 37,000.

Mr. Stace considers that in the past too little attention has been given to the economic aspects of development in the Pacific. Administering governments have gone far in providing health services and education, but the means to ensure the permanence of these services, *i.e.*, increased production, has not always received equivalent attention.

Scant Attention Paid to Economic Development

This has caused two important problems. Firstly, production has barely kept pace with increased population. Secondly, there is insufficient opportunity for educated islanders to make use of their training. Aggravating the latter is the lack of technical and agricultural education, the result being that the islanders emerge from the schools with an education suitable as a basis for clerical work but not for other skilled occupations. A "white-collar" bias has developed, and since this field is very limited, it would be surprising if frustration did not exist in some quarters.

One of the advantages of co-operatives is the greater participation of islanders in management and commercial practice, the experience gained in "learning by doing" being particularly valuable. Mr. Stace regards participation of the islanders in commercial activity as especially important, and suggests that this should be achieved even at the expense of some advantages of technique and efficiency. For example, he recommends that banks should consider employing islanders in clerical and other skilled capacities, and also that banking facilities be extended to islanders wherever at all possible. The Bank of American Samoa, where, except for the Manager, all employees are Samoans, has shown that these things can be done once the people have some understanding of the processes involved and the advantages which accrue.

Mr. Stace does not agree with the view that the islanders are inherently less able to engage in commercial pursuits. "European or Asian people developing their cultures in a circumscribed Pacific environment," he says, "could not have evolved efficient money systems of the types now operating in economically-developed countries. The easy living conditions and restricted scope for the exchange of goods and ideas previously obtaining in the Pacific would preclude rapid evolution of monetary techniques." But with the islanders' intense desire now to participate in the modern world, and with the pressure of population in the area, more highly developed techniques in all fields must be adopted. As far as money and credit are concerned, an essential task is to instruct the islanders as to why and how such facilities should be used. Co-operatives can do this best of all, while achieving other more material results at the same time.

These are the general observations of the Stace Report. In addition, it contains much interesting information and comment on the facilities available for voluntary saving, on government lending and marketing, and compulsory saving schemes, on commercial banking, on private lending, and on the various forms of co-operatives operating in the area. It is worthy of close study by administrators and businessmen, by the islanders themselves, and in fact by all who are interested in the development of the Pacific and the welfare of the island peoples.

Economic Felling of Old Coconut Palms

By W. V. D. PIERIS

IN the replanting of regularly and properly-spaced plantations rendered uneconomic through age (*i.e.*, when the palms have reached their sixtieth year) the customary practice is to plant the new seedlings in the centres of the squares or triangles formed by the old palms.

The seedlings develop under the canopy of the old stand, and under good management come into flower not later than the seventh year after transplantation. At this stage the old palms have to be removed, a difficult and costly undertaking, because in felling them great care has to be taken not to damage the young palms.

The part of the old palm that does the greatest damage is the crown which, falling from a height of 60 feet or more, could completely crush a young palm. To obviate this danger, the usual method adopted is for climbers to go up and cut off the fronds half way down the stalks, leaving the upstanding unopened central fronds intact. The palm is then accurately felled with an axe two or three feet above ground level. The cost of such work is very high, even where labour is plentiful.

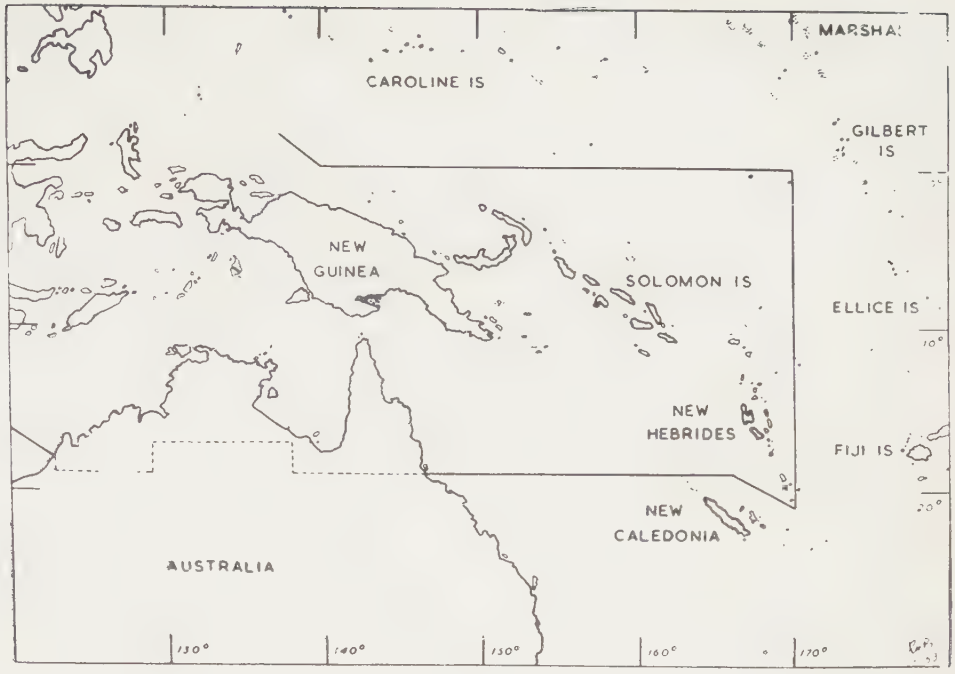
A cheaper, quicker, and much more efficient method is to poison the palms before felling. This is usually done with an arsenical weed-killer. One ounce of the substance is poured into a hole 12 inches deep, drilled at the base of the palm.

In Ceylon, Atlas Weed-killer, a proprietary weedicide, has been successfully employed for the purpose, and recent work on the Russell Islands plantations owned by Lever's Pacific Plantations Pty. Ltd. shows that Cooper's Weedicide is also effective. It is claimed by Lever's agronomist, Mr. A. H. Green, that one man could poison 50 palms a day in this manner.

The advantages of poisoning before felling are: (i) the palm dies, and the fronds dry up and fall in due course, leaving a clean stem which can be felled with precision; (ii) with the death of the palm, it ceases to compete with the young replants for moisture, soil nutrients and sunlight; (iii) the felling of the old stand can, therefore, be carried out in a more leisurely manner than otherwise.

It should be remembered, however, that the poison acts locally where it is injected, and is not translocated along the trunk up to the crown. This means that the trunk can still serve as a breeding ground for rhinoceros beetle unless it is rendered inaccessible or destroyed by fire. (A note by Mr. Pieris on the disposal of dead palms appears on page 28 of this issue.—EDITOR.)

This map shows distribution of malaria in the South Pacific area. The area included on the mainland of Australia has either only a small amount of malaria or is potentially malarious. There are several small islands included in the outline on which malaria is not endemic, such as Nauru, Ocean, Bellona and many of those in the Torres Straits.



Malaria Protection By Drugs

This article on the use of anti-malarial drugs was contributed by Dr. Robert H. Black, malariologist of the School of Public Health and Tropical Medicine, Sydney. In recent years Dr. Black has undertaken several surveys of malaria in South Pacific territories for the Commission.

MALARIA is an entirely preventable disease. As the result of modern research there are now available synthetic drugs which are effective in the complete suppression of the malaria which is found in the South Pacific area. However, attacks are not infrequent amongst Europeans resident in highly-infected countries.

The countries in which the disease occurs in the South Pacific are shown on the map. A few islands included in the outlined area are naturally free from endemic malaria, such as Nauru, Bellona, and some of the Torres Straits islands. Others, such as Samarai, have been freed of it. The amount of malaria in New Guinea, Solomon Islands and New Hebrides varies somewhat from locality to locality, and may be absent in some, but in general it may be taken that the incidence of malaria in these areas ranks high when compared with other parts of the world. The malignant tertian infections are deadly when untreated, and the benign tertian infections are well-known for their tendency to be followed by persistent relapses following ordinary treatment.

The old belief still exists that living in these areas necessarily entails suffering from attacks of malaria, and even blackwater fever. Indeed, malarial attacks are so prevalent in Europeans that each one is his own physician when it comes to treatment. That this position is unsatisfactory is evident when attacks occur among New Guinea residents visiting Australia. It appears that the medical briefing of new residents is absent or inadequate, or is done by misinformed old residents. whose experience has been gained from numerous attacks of malaria and probably one or two attacks of blackwater fever.

The legend that quinine will prevent attacks of the malaria seen in the South Pacific is a persistent one, fostered by those residents who came to the tropics when quinine was the only drug available for its treatment. These people have been so exposed to malaria and have had so many attacks that they have acquired some immunity to the disease, as do the natives of the country. But this partial immunity has been acquired at the expense of many weeks of sickness.

The Expeditionary Force which went to Rabaul in 1914 soon learnt that the usual dose of quinine taken as a prophylactic was ineffective, and many of this force had to take quinine in doses which in effect constituted continuous treatment of an attack of malaria. In the 1939-45 war the large amount of malaria in the forces at Milne Bay demonstrated again the ineffectiveness of quinine as a malarial suppressive. And yet there are still people, who should be better informed, who persist in taking quinine daily to ward off the disease.

Research work at Cairns, using volunteers from the Australian Army, clearly defined which drugs were effective in preventing attacks of malaria. This work was done by a skilled team making accurate scientific observations. Their results cannot be challenged by retailed hearsay information on the failure of anti-malarial drugs which has been printed in the lay press. At Cairns it was shown that quinine was ineffective in preventing malaria, but that Atebrin would prevent malaria attacks and cure malignant tertian infections. Chloroquine was also investigated and, towards the end of the war, very satisfactory results were obtained with Paludrine. The strain of malignant tertian malaria from the Aitape - Wewak area, which was resistant to Atebrin, was found to be readily controlled by the use of Paludrine.

These results, which were obtained with malaria parasites from New Guinea and the Solomons, permitted the view to be taken that troops who suffered from malaria were not regularly taking their suppressive drugs. The parasites, from the evidence available at present, have not changed, and it may equally well be said now that Europeans suffering from attacks are not regularly taking suppressive drugs.

Suppressive Drugs Available

There are several drugs available for the efficient suppression of malaria. They are effective when they *are* taken and taken *regularly*.

The taking of a tablet every day presents quite a problem. In the Australian Army it became the responsibility of an officer to see that all his men took their

suppressive drug daily. In a family unit a routine may be worked out. Depending upon where the managing influence lies in the family unit, the male or female adult may be responsible for the taking of the suppressive drug by the whole of the family.

Drugs which can be used are:

Paludrine: One tablet (100 mgms.) *every day*. Children over twelve years as adults, dose scaled down for younger children according to age and weight, but no child, however young, need be given less than 25 mgms. at any one time (there are 25 mgm. tablets available);

Chloroquine: Two tablets (500 mgm.) on the same day *every week* (children, 1-4 years ½ tablet, 4-8 years 1 tablet, over 8 years—adult dose);

Daraprim: One tablet (25 mgm.) on the same day every week.

It is a common thing to find that children do not like the taste of Chloroquine, but can be made to take Paludrine. (Chloroquine is practically synonymous with Nivaquine and Aralen.) Daraprim is a recent addition to the ranks of anti-malarial drugs, and experience in its use is as yet somewhat limited. A sufficient amount of drug for the effective suppression of malaria for one year costs less than £A.1 (*i.e.*, less than one penny per day), which is very cheap insurance against this disease.

It is stressed that these drugs must be taken regularly, for it is upon their continued administration at regular intervals that their anti-malarial effects depend.

With one of these strict regimens of suppression, no attacks of malaria will occur, despite residence in localities of high malarial incidence. If the drug is continued for a month or more after leaving the malarious country, all infections with malignant tertian malaria will be cured, but the individual will become liable to attacks of benign tertian malaria when he stops taking his suppressive drug.

If the absence from the malarious country is to be brief, then the suppressive drug should be continued. If it is to be prolonged, courses of treatment with drugs such as Plasmoquine or Primaquine combined with quinine, Paludrine or Chloroquine are available which will, in the vast majority of cases, eradicate the residual benign tertian infection from the body. Such courses of eradication should be taken by people who have finished their period of residence in the tropics, and by those leaving the area for prolonged periods. Casual visitors would be well advised to take a suppressive drug during their stay in infected islands and for a month thereafter, taking an eradication course if they suffer from benign tertian malaria after their return home.

Reference, so far, has been to the suppression of malaria in non-immune Europeans. All that has been said concerning them may equally be applied to natives of the South Pacific who come from non-infected countries and who are equally susceptible to malaria. This was learnt early in the history of the missions in New Guinea, when Polynesian teachers were installed along the south coast of Papua and many died. In more recent times labourers have been and are being brought from non-malarious Wallis Island to the New Hebrides, where they receive the same malaria suppressive drug as Europeans. Similarly, in Papua - New Guinea, native labourers from the non-infected parts of the highlands must be given malaria suppressives when they are brought to work on the highly-malarious coast of that country. All these cases are comparable to the non-immune European who is going to a malarious country to do a job of work and then return home to a non-infected country, and whose anti-malarial regimen has been discussed.

The position is different in the case of the native labourer coming to work in a malarious area from a village which is malarious. Depending on the amount of malaria in his village, this native has in his lifetime built up a varying amount of immunity to the malaria which occurs in his village. At the new location where he is employed he encounters new strains of the parasite, and may suffer from attacks despite his immunity.

Attacks of malaria in labourers represent a wastage of labour. This wastage is readily eliminated by administering suppressive drugs. In this way a labour force with its attendant wastage from malaria can be effectively increased at a very small cost per annum for suppressive drugs. (In the individual case, how convenient it is to have a houseboy who never suffers from malaria because he is given a suppressive drug.)

It must be realized, however, that the immunity the native has acquired depends for its continuance upon repeated contact with the malaria parasite. When this contact ceases, as is the case when suppressive drugs are given, then the immunity lessens. By the time the native is returned to his malarious village he will have become liable to attacks of malaria again as he was when a child. Back in his village he will not be taking suppressive drugs — even if he could afford them, we have seen how difficult it is even for unsupervised Europeans regularly to take their suppressive drugs. Thus, the expediency of slightly increasing the labour force of a country actually results in reducing the immunity to malaria of the young adult males of the population. It would be a very cynical attitude which would countenance this approach to the malarial problem. If, however, there were no malaria in the village to which the labourer returned, the whole aspect of the problem would be changed, and it is in this approach that many countries have made progress. The problem of village control of malaria is a complex one, and must be studied individually from country to country. Methods suitable in one place may result in waste of money in another.

Meanwhile, during the period when methods of anopheline control are being worked out, the European should set an example by taking great care with his malarial suppressive regimens and thus averting attacks. Malaria is an entirely preventable disease.

Published with the permission of the Director-General, Department of Health, Commonwealth of Australia.

Mosquito control in Fiji. A medical assistant sprays a pool to destroy larvae.
Fiji Official Photo.

Valuable shade is provided by the overhead canopy of fronds resulting from triangular planting of palms.

INTRODUCTORY NOTE BY W. V. D. PIERIS, TECHNICAL OFFICER (COPRA), SOUTH PACIFIC COMMISSION.

The following article from the "Ceylon Coconut Quarterly" is of importance to coconut growers in all parts of the world. It demonstrates the value of seed-selection, cultivation, green manuring and artificial fertilizers in a certain type of soil and climate.*

The author claims to have obtained in 1952, on an 8-acre block of 510 palms, the majority of which were 25 years old, a yield of 5,796 nuts, equal to about 1¼ tons of copra per acre, at a conversion rate of 4,600 to 4,800 nuts per ton of copra. The average yield per bearing palm in that year was 116 nuts.

What is specially striking about these and previous results quoted in the article, is that they have been achieved under conditions of rainfall generally regarded as adverse to the proper growth and production of the coconut palm, and on a triangular spacing of 26 feet, giving over 70 palms to the acre.

The best planting distances for the tall varieties of the coconut palm, in relation to various types of soil and climate, are not known, and it would be well for agricultural and research institutes in all coconut-growing countries to give special attention to this question.

I myself recommend a spacing, based on general experience in Ceylon, of 28 feet on the square, giving 55 palms to the acre. More or less the same result can be achieved by a triangular planting at 30 feet.

Experimental Cultivation Of Coconuts In Ceylon

MARCUS S. ROCKWOOD

Achchitotam Estate, Mundel, near Puttalam

IT was an inherited love of the soil that urged me to carry out experiments on my own. Modern ideas at that time were stimulated in me by my good friend Mr. P. A. Keiller, Analyst of the Colombo Commercial Co. Ltd., and the late Gate Mudaliyar Rajapakse who, as everyone knows, was then a leading authority on coconuts.

There was, attached to my Achchitotam Estate at Mundel, 10 acres of jungle land. This jungle, to all intents and purposes, can be considered as virgin forest: it was forest for several hundred years and carried some of the best known hardwoods and other valuable timber. The soil is a greyish sandy loam of a non-lateritic type, hard when dry, but friable and suitable for good root development. The average rainfall is about 45 inches per annum, with shade temperatures rising to 90 degrees. Elevation is only about 20 feet above sea-level.

In 1927, I cleared these 10 acres by the methods then prevalent. As I had set my heart on having a fruit orchard run on scientific lines, I set apart two acres for this purpose and used the remainder for coconuts. I proposed to adopt methods different from those then in vogue and to experiment with the following objects in view:

(1) To obtain a greater number of trees per acre.

(2) To reduce soil temperature to combat long periods of drought and uneven distribution of rainfall.

(3) To test the efficiency of mass-selection of parent trees.

(4) To record the progress of well-selected seedlings, carefully tended up to maturity.

(5) To combat the growth of Illuk.**

At that time, these five points of investigation were breaking new ground, and I am glad to say that the results have been amply rewarding. I feel I can now lay claim to being the first in the field in this country as the only person to have a group of coconut palms with individual records of yields (six during each year) over the past 25 years from the first day nuts were harvested.

I am indeed proud of this achievement. If I were able to repeat the work, however, I would plant without burning, and I would strongly recommend this experiment to those who are younger, and able to carry it through and see the results.

To make my multi-purpose experiment clear, I will now refer to each of the five points in detail:

1. To get a greater number of palms to the acre, I adopted the triangular, or alternate system of planting. The plants in each row alternate with the plants on either side of it. They are in straight lines whichever way one looks, and the palms are equidistant. In the square method of planting, two rows of equidistant palms cut each other at right angles; in the triangular method, there are three equidistant rows cutting each other at 60 degrees. This, I consider, is an advantage for the cultivation and also for the manuring of the coconuts by the method of broadcasting the manure, which method will in my opinion soon supersede the method of manuring coconuts by the age-old method of circular rings or trenches round the base of each individual palm. In the case of the 26-feet spacing distance between palms, which I adopted, the distance between the rows is actually about 24 feet. This triangular method of planting gives 15% more trees to the acre. In my 8 acres I have got 572 palms, as against the 640 which I would have had on the whole 10 acres of land at the same planting distance, using the square method. Though I am short by 68 palms, equal to a trifle over 1 acre, I have been able to get the 2 acres I wanted for my fruit orchard at the sacrifice of the equivalent of only 1 acre of coconuts.

2. With this triangular system of planting, the circular crowns of the palms more or less meet each other in the centre of each triangle, thereby forming a complete overhead canopy. This prevents the direct rays of the sun scorching the soil below, so the soil temperature and the rate of transpiration of soil moisture is thereby reduced and also the raindrops do not directly strike the soil. Those who have experienced the effects of the droughts during the past few years can imagine what this shading means to coconut plants in dry areas, such as the Puttalam District. It is almost a filtered ray that strikes the

* Issues dated January - March, 1952 (Vol. 3, No. 1), and January - March, 1953 (Vol. 4, No. 1).

** Lalang, langlang, cogon, kunai, **Imperata Cylindrica.**—EDITOR.

ground, even when the sun is directly overhead. When walking between the rows, a definite gloom is noticeable, especially when the sun is shining brightly overhead. In the square method, the ground between the rows is fully exposed to the rays of the sun, and the ravages of the heavy downpours which occur periodically in this district.

3. Selection was carried out by choosing a field in the best-yielding portion of the main estate with a yield of about 4,500 nuts per acre per annum. The procedure was as follows: You spot by the eye the palms you consider most suitable, mark them, and start recording each crop for at least two years. At the end of this period, you select your parent trees from amongst those yielding over 100 nuts per palm. Fuller and more accurate methods have been worked out more recently by the Coconut Research Institute, and information may be had on application.

4. It is hardly necessary for me to elaborate on the necessity for the elimination of undesirable plants in the nursery, and for having well-prepared holes for planting out the selected seedlings. My procedure, after planting out, was to manure the young plants only after the third year, in the belief that the food material in the husk and in the nut, together with the food material in the well-prepared hole, and with almost virgin soil all around it, was sufficient for the young plant to carry on. From the fourth year onwards I gave each plant half a pound of muriate of potash, and I increased the dose each year by half a pound, until I reached 2 lbs. There is no doubt potash is a limiting factor for coconuts on these and other light loamy soils. For this knowledge I am greatly indebted to experiments carried out by Pacific Export Ltd., and to the trials carried out by the Colombo Commercial Co. Ltd., under the direction of Mr. P. A. Keiller in the 1920's, at Hunupitiya.

The progress made as a result of the application of potash was truly remarkable. From the eighth year onwards, manuring was carried out once in two years. Nitrogen and phosphoric acid were then added to make up a complete mixture. Only very limited quantities of nitrogen were added for a number of years, owing to its presence in the green manures which were regularly incorporated into the soil. Unfortunately, during the War years, I could not adhere strictly to this manurial programme nor to the two yearly periods of application, and this, together with the droughts experienced, made it impossible for me to obtain the target yield of 50,000 nuts within the time I had fixed. I hope, however, to reach this figure shortly, *i.e.*, to exceed 6,000 nuts per acre, per annum.

5. Illuk grows rampant on newly-cleared areas, and well knowing the damage it can do, and the hindrance it is to cultivation, at the end of two and a half years, as soon as my catch-crop of plantains was removed, the whole area was ploughed and harrowed. When finishing off with the chain harrow, a mixture of *Calapogonium mucunoides* and *Centrosema pubescens* was sowed in rows with my seed drill. These covers were periodically harrowed, ploughed, or buried in trenches. After a period of ground covers, *Boga medelloa,* an erect shrubby cover, was grown in alternate rows, and when ready it was cut and buried in the other rows. The growth, both of the creeping and of the erect covers was exceedingly good. The ground cover was usually 2 to 2½ feet thick, and the latter 4 to 5 feet high. By adopting such measures in the early stages, I not only eradicated the illuk completely, but also added to the already good earth very large quantities of green nitrogenous material. As the years passed by and the palms grew up, the canopy referred to above was sufficient to provide overhead shade and so keep the illuk under control.

Besides the cultural methods described above, all droppings and other estate litter were buried. The huge butt-ends, however, were removed and burnt, and the ash returned to the soil. The necessity for precautions against soil erosion did not arise, but draining was a problem. During the last 10 years or so, manuring was done by broadcasting the manure between the rows and incorporating it into the soil by harrowing. When weed growth is excessive during favourable weather conditions, it is slashed down with the harrow, but unfortunately even this had to be neglected during periods of low prices.

Results

The progressive improvement in yields in my new area of coconuts is shown by the following figures:

1927—May-October: Area planted with 572 palms.
1931—June: First palm in bearing, No. 264, gave 43 nuts.
1933—6 years: 48 palms gave 1,341 nuts, No. 255 giving 104, and No. 264 giving 105.
1934— 7 years: Total crop, 4,243.
1938—11 years: Total crop 27,450.
1942—15 years: Total crop 34,256.
1946—19 years: Total crop 42,950.
1950—23 years: Total crop 42,975.* (Short crop due to previous drought.)
1952—25 years: Total crop 46,367.

I very nearly achieved my target of 50,000 nuts, which is equivalent to over 6,000 nuts per acre per annum. In fact, I am sure I did achieve it, but owing to crop thefts (in consequence of which I had to make staff changes) I was robbed of the full results of my 25 years of work. Readers will be better able to appreciate this when I state that the third crop of 1952 was 11,798 nuts and the fourth crop was 10,537 nuts, but the succeeding fifth and sixth crops were together less than the fourth crop.

In July, 1945, and after recording the individual yields of 121 palms for three years, Mr. W. V. D. Pieris, former Geneticist of the Coconut Research Scheme, wrote as follows: "There are some real champions in these selections, the supreme champion and gold medallist being palm No. 259, which gave an average nut yield of 160 nuts, and husked nut weight of 239.45 lbs. per annum — equivalent to 8.55 candies** per acre per annum, with an out-turn of 1,123 nuts per candy."

In February, 1949, again, the Geneticist wrote as follows: "It is interesting to note that in the other lot of 65 palms, for which records are now available for seven years, the yield of nuts remains at a high level—No. 259 still stands as the champion palm, with an average yield of 147 nuts per year during the last seven years."

Of 510 palms in bearing during 1952 (*i.e.*, excluding young supplies):

2	palms	yielded	over	160	nuts	per	palm
1	,,	,,	,,	150	,,	,,	,,
8	,,	,,	,,	140	,,	,,	,,
17	,,	,,	,,	130	,,	,,	,,
18	,,	,,	,,	120	,,	,,	,,
50	,,	,,	,,	110	,,	,,	,,
74	,,	,,	,,	100	,,	,,	,,
89	,,	,,	,,	90	,,	,,	,,
77	,,	,,	,,	80	,,	,,	,,

Thus, 336 palms, or over 66 per cent., yielded an average of 98 nuts per palm per annum. Taken as a whole, the 510 palms yielded at the rate of 6,530 nuts per acre. I consider this achievement commendable, though I feel that 7,000 nuts per acre is quite within the range of possibility with normal rainfall.

Method of Improvement

My policy has been to replace all failures, and all weak and unhealthy palms, as soon as I was satisfied of their inferiority. In all my experience during the last two decades as a valuer and visiting agent, I cannot bring to mind any one estate on which this process of elimination was carried out. I consider it false economy not to do so, since to have uneconomic palms is as bad as having "vacancies" on the land. Between 1940 and the end of 1951, I had replaced a total of 62 out of the 572 palms with "supplies" of second generation seedlings, produced from seed nuts collected from the recorded parent palms in this new area. As in 1946 these palms were less than 20 years old, it will be

(*Continued at foot of page overleaf*)

* NOTE: During the N.E. Monsoon of 1949-50 the rainfall during 8 months was only 17 inches.

** One candy equals 560 lbs., or ¼ long ton. EDITOR.

INTRODUCTORY NOTE BY DR. E. MASSAL, EXECUTIVE OFFICER FOR HEALTH, SOUTH PACIFIC COMMISSION.

Mental health is an essential element in the concept of total health universally accepted to-day. In the Pacific territories this concept is beginning to be accepted, and its interest has not escaped educationists, sociologists and doctors. However, these experts often have only vague ideas of mental health, and of the methods required to ensure its maintenance and development.

Dr. F. W. Clements of the Institute of Child Health in the Commonwealth Health Department, Australia, was Chairman of the Seminar on Mental Health in Childhood, organized by the World Health Organization in Sydney in August, 1953. He has been kind enough to write, for the "Quarterly Bulletin" the article which follows. Readers will find in it accurate conceptions and clear directions on the mental health of the child, the basis of solid mental health in the adult. These concepts and directions will certainly be useful to those concerned with these questions in the South Pacific territories, where everything — or nearly everything — has still to be organized and carried out.

Mental Health In Childhood

Some Concepts Discussed During WHO Seminar

THIS seminar was the first of this kind sponsored by the World Health Organization in the Western Pacific Region. More than sixty members assembled from fourteen countries of Asia and the Western Pacific. An important feature of the meeting was the fact that there were representatives from at least seven disciplines, as the following figures show: psychiatrists (14), paediatricians (10), maternal and child health services (7), social workers and social scientists (7), psychologists (6), nurses (6), educationalists (5), public health administrators (3), school medical service (2), teacher of public health (1), cultural anthropologist (1).

During the seminar the members expressed a strong desire to set down some guiding principles for the development of programmes designed to develop good mental health in the community. They felt the first need was to have some conception of what mental health was. They decided that the most satisfactory way to express their ideas was to expand the idea of "health" developed by the World Health Organization. They accepted the following statement:

> "Health is a state of complete physical, mental and social well-being and not merely the absence of want. *Mental health* is an essential component of this concept of total health."

Mental health is not a static condition, but is subject to variations and fluctuations. The state of mental health is generally reflected in the individual's capacity to form harmonious relations with others and to participate in, or contribute to, changes in his social and physical environment.

In considering this idea in relation to children, the members of the seminar recognized that the potentials of a child are continually developing, and that the mental health of the adult is rooted in the sound mental health of the child.

Good mental health is likely to occur in a family and community where the parents and other members of the family are healthy and living harmoniously. For then they are better able to nurture the child in such a way as to build a robust personality.

Factors which influence physical health may directly or indirectly affect mental health. These factors included genetic constitution, the hazards of birth and actual physical disease.

Each child is different individually, and a child is likely to develop his potentialities more fully when individual differences in physique, intelligence and temperament at each stage of their development are understood and taken into consideration by the adults charged with their care and training.

It is only from the child himself that we can learn, by listening to and watching him, what his especial personal needs are. Unless a mother has some deep resentment against her child, and providing she is emotionally sound, she does usually learn to know her child and to be able to understand his wants and desires.

Experimental Cultivation of Coconuts in Ceylon (*Cont. from previous page*)

interesting to see how these "supplies" will turn out, in view of the prejudice against seed-nuts taken from young palms.

It would have been much more satisfactory, of course, to have planted them in a new clearing rather than as "supplies" in a mature area, because of the continuous canopy of overhead shade which results from the triangular method of planting. In consequence of this shade the nursing of the "supplies" was quite a problem, because, unless the seedlings had been well looked after and nourished all the time, their rate of growth would have been very slow and they would have taken a long time to reach maturity.

Production of Selected Seed Nuts

The selected palms continue to be recorded, and the crops from these mother palms are now being selected by an officer of the Planting Division of the Coconut Research Institute and used as seed nuts in the nurseries established under the Coconut Replanting Scheme. The number of "mother" palms from which these are selected represents a fifth of the total number of palms which, I think, constitutes a record for all the areas from which seed nuts are collected for this purpose. Nevertheless, considering the high yielding capacity of this experimental area, I feel that 80 per cent. of the palms are fit to be used as mother palms, as the derived seed nuts are better than "block nuts" of doubtful origin.

Out-turn or Copra Equivalent

The variation in the number of nuts required to make a candy of copra has been considerable. This is entirely due to weather conditions, as the conversion rate increases according to the length and severity of the drought or droughts in the year preceding and, on very neglected properties in this region, it can reach as much as 4,000 nuts per candy. My maximum figure has been in the neighbourhood of 1,400 during 1939, following the drought of 1938 when, during six mid-year months, the rainfall was only 2.77 inches. In normal periods, when the rainfall has been in the neighbourhood of 40-45 inches, and evenly distributed, it has been between 1,150-1,200, while during unusually good periods with 55-60 inches of well-distributed rainfall it has touched the lowest record of 848 and maintained an average of 962 during the last two and the first two crops of 1951 and 1952 respectively.

I hope that the information I have set down will be useful to the practical planter, who, I hope, will get even better results than I have obtained, by further improving on my methods for the benefit of future generations. Then, I feel that I will have made a useful contribution in thus recording the results of a quarter-century of pioneer work in the cultivation of coconuts.

One of the group discussions that followed presentation of each paper at the Seminar. The Director of the Seminar (and author of the accompanying article), Dr. Frederick W. Clements, appears in the left foreground. Dr. Clements is Lecturer-in-Charge, Social Pediatrics, Institute of Child Health, Sydney University.

Our understanding of the individual child's needs is helped if we remember that he behaves meaningfully to himself within the limits of his maturity and experience. All or any of the child's experiences may affect his later behaviour, even if the experiences are not consciously remembered.

Emotional security of the kind that derives from intimate relationships with loving parents or parent substitutes is one of the basic needs of children.

Conflicts Inevitable

In the course of the child's development, conflicts are inevitable. These are often associated with desires for dependence or independence, and may give rise to emotions in parent and child which are disturbing to both of them. Either may temporarily feel hostility towards a person who is usually greatly loved, and this emotional experience may arouse anxiety. If the essentially normal nature of this reaction is understood by parents they can better tolerate their own feelings, and in their turn give help to the child.

It is a matter of common observation that emotional problems exist in every person, group, community and society. Good mental health means the capacity to handle these emotional problems without marked disturbance to the person or group.

Public health authorities throughout the world are aware that as ill-health from malnutrition and infection become less with technological advance, emotional problems become more obvious. This tendency may perhaps be counteracted in countries where urbanization and industrialization are in their earlier stages, by the application of the accumulated knowledge of mental hygiene available in other parts of the world, and by avoiding the latter's mistakes. With the existing knowledge it should be possible to modify undesirable trends in social development.

The physically and mentally handicapped children are often, by virtue of their handicap, unfavourably placed for the realization of the full development of personality, and of adapting adequately to the demands of their life in the community. It should be realized that these handicaps are not fixed states, but are capable of amelioration. By proper care and assistance such children can be greatly helped to proper development and adaptation.

Discussion Points

Towards the end of the seminar a discussion was held on "Planning to Meet the Psycho-social Needs of Children". A number of important points were made. Those which might be applicable in the South Pacific area are given below:

For its practical application, the needs for mental health should be interpreted in terms of everyday living of the people, and each worker in the field of health, education and welfare needs to be able to interpret these principles according to the needs of the environment.

The needs of the community with respect to mental hygiene should be met as they arise, but every effort should be made to avoid arousing anxiety by stimulating action which the community is not seeking. Unwise publicity suggesting evils that do not exist, thereby creating anxieties or cures that do not exist, thereby raising false hopes, is most undesirable.

A sound programme of mental hygiene should begin with adequate pre-natal care, followed by sound natal and post-natal supervision.

In post-natal supervision, stress should be laid on the need for the establishment of breast feeding with the avoidance of rigid programmes.

The criteria of selection of public health nurses and other community workers should be reviewed to make sure that only the most suitable are employed. Much damage to the mental health of mothers can be done by unsuitable personnel.

Unnecessary hospitalization should be avoided with children under five years of age. When hospitalization of young children is unavoidable, great care should be given to the preparation of both parents and the child, and greater understanding shown of the child's emotional needs during the period of separation.

In the Asian-Pacific countries, owing partly to pressure on beds, there seems less unnecessary hospitalization and the members of the seminar urged things to be kept that way. In their opinion it is better for the resources to be used developing home services rather than elaborate hospital development.

In countries where the mother is habitually admitted with the child, there is a tendency for nurses to become mere distributors of drugs, when perhaps they might be used to help the mother to a better understanding of the child and its condition. They might also be used to explain desirable health practices to the mother.

The professional training of teachers needs to be expanded to equip them to contribute more effectively to sound mental health programmes. In the past, in general, too much emphasis has been placed on the acquisition of professional techniques for the teaching of specific skills, with too little provision on the development of the personality of the teacher or of understanding the needs of the developing child.

Since one of the principles of mental health is that a child should integrate all his experiences, there should be the closest co-operation between home and school at all stages of a child's life. This is particularly necessary in the less well developed areas. New ideas and values are being introduced at school which are often in conflict with those traditionally held by parents. Conflict and misunderstanding in the home can often be lessened by the teacher, who acts as an interpreter of the new ideas and values to the parents also.

Fiji Plant Introduction Station

*In the agricultural development of the region, the introduction of economic plants is regarded as an activity of major importance by the Commission. Since 1950 it has assisted, by grant-in-aid, the development as a regional plant introduction centre of the Naduruloulou Plant Introduction and Quarantine Station, Fiji, described in the article below.**

Bananas provide shade for this experimental cacao plot at the Naduruloulou Introduction Station. – Fiji Official Photo.

THE Naduruloulou Plant Introduction and Quarantine Station comprises part of the former Central Agricultural Station conducted by the Fiji Department of Agriculture during the period 1928-1945. It is eighteen miles by road from Suva, with frontage on the Rewa River.

The area made available in 1949 for the station comprises 146 acres of Crown land. Approximately 50 acres are flat, while 96 are low hill slopes, with several small valleys suitable for nurseries or special crops. There is a good water supply.

Part of the area had been fenced, drained and cleared, and a considerable section planted with valuable grass and legume pasture and fodder plants. Certain tree crops were also established—tung-oil, cacao, citrus, coffee, tea, coconuts, bananas—while a large number of economic tree species was growing in the arboretum, occupying some ten acres.

The actual work of developing the station as a regional plant introduction centre, with Commission assistance, began in July, 1950. Since then, development has been steady, as the following notes indicate (they are taken from a progress report on the station for January-August, 1953).

New land areas for propagation work have been substantially developed. Paths and roads provide improved access; extensive drainage systems have been installed; while fences have been built and hedges planted to protect special crops. The water supply has been improved, and pumping equipment is being installed.

New areas have been cleared and prepared for a variety of economic crops: cacao, root crops, rice, vegetable crops, fruit trees and pasture plants. The work on cacao propagation has been expanded and the plant house enlarged.

Since the present phase of the work was undertaken with Commission assistance, the acquisition of plants and seeds has totalled 961.

Some introductions and activities of special interest during 1953 were:

Rice: Salt water tolerant strain from Ceylon: var. *Caloro* from Australia.

Pasture Plants: 15 species of grasses and legumes from Texas, 10 of which were new to the region; 6 strains of Bahia grass and Pensacola grass from Georgia, U.S.A.

The harvesting of seed from other established pasture plants resulted in a total of 25 bags (930 pounds) or sufficient to sow approximately 150 acres of pasture. The demand for this seed has increased, both from within Fiji and from overseas, and it is anticipated that the entire crop will be distributed to coconut estates, and dairy and cattle farms in the region.

Other species in current demand are *Centrosema pubescens, Pueraria phaseoloides, Stylosanthes* spp., and *Panicum maximum* of which several strains are now available at the station. The bulk production of all these species is being arranged at the Fiji Department of Agriculture Pasture Seed Farm at Dobuilevu, Ra.

Pulses: Six important species of beans from Bogor, Indonesia.

Cacao: A most valuable acquisition has been one rooted cutting of the Western Samoan Lafi No. 7, donated by the General Manager, New Zealand Reparation Estates. This, and a cutting from it rooted at the station, have been successfully established. A collection of Cacao strains from Trinidad and Grenada has been obtained through the Kew Gardens.

Actually, considerable attention has been devoted to this crop. The new introduction from Samoa, Papua and New Guinea and Trinidad have been carefully tended, and are growing well. The older established trees have recovered from hurricane effects, and many are bearing heavily. Methods of vegetative propagation have been studied and a number of cuttings from selected trees established. In all,

(*Continued on Page 30*)

* An article on the establishment of the Naduruloulou Garden by Mr. B. E. V. Parham, Deputy Director of Agriculture, Fiji, appeared in the **Quarterly Bulletin** for October, 1951.

A view of the rugged, precipitous north coast of Futuna Island.

Futunese canoes. The net in the background is for catching flying fish.

A Health Survey Of Futuna Island

A. R. MILLS

British Service Medical Officer, New Hebrides;
South Pacific Health Service

Dr. Mills, after a medical tour on Futuna in 1952, wrote two reports. One concerns a demographical survey of the causes of de-population; the other deals with the problem of malaria, which distinguishes Futuna from the other islands in the New Hebrides. These reports, which will be published in medical journals, are summarized in the article below.

THE island of Futuna (which should not be confused with one of the same name in the Wallis and Hoorn Group) was discovered by Captain James Cook during the course of his second voyage in 1774. It lies the farthest east of any island in the New Hebrides and is also the first inhabited island east of long. 170°E. (the Buxton line) in the whole of the Melanesian chain of islands, which sweep in a wide curve east and south of New Guinea.

In November, 1952, I carried out a malaria survey on Futuna, and was able to establish what had often been supposed — that there was no malaria on the island, nor were there anopheline mosquitoes.

During this survey I was fortunate enough to find the old papers of Dr. William Gunn, a medical missionary who had lived on the island from 1883-1903 and had kept detailed records relating to the native population for inclusion in his mission reports. These figures, together with the results of my own census and other estimates, give an unusually accurate picture of the population changes which have taken place over a long period in one small island in the New Hebrides.

Futuna is a "high" type of Pacific island, roughly circular in shape and about two miles across. When viewed from the south-east its profile resembles that of a great truncated cone. Its flat summit reaches a height of 1,931 feet.

The island has a thick coral limestone crust overlaying a stratum of hard igneous rock, and all the water sources arise between the coral above and the hard black rock below. The coral reef which fringes the island, and its rugged precipitous coastline, present a scene remarkable for its natural beauty.

The climate is tropical, with two fairly well defined seasons—that of the E.S.E. trade wind from about April to November, and the hot or doldrum season from December through March. There is less rainfall during the former, but there is no real dry season.

The slopes of the mountain are covered with brush vegetation, often very dense, and the soil is black and extremely slippery when wet. The foliage varies from beach forest, through tropical rain forest to *montane* forest on the flat summit, and there are coconut plantations near all the villages. The islanders are cultivators and fishermen. A small amount of copra is produced and food crops are grown, terraced gardens being seen even on the steep slopes.

The fishing off Futuna is excellent. The natives fish from the reef with a spear or bow and arrow, or from canoes with a line or spear. These canoes are beautifully made, having carved decking fore and aft and broad wash strakes all neatly sewn with sennit. The most seaworthy canoes in the New Hebrides, they are quite capable of withstanding the seas surrounding this exposed island. The closest land is the island of Aneityum, about 41 miles to the S.S.W., and Tanna, about the same distance to the west.

The Futunese

The Futunese themselves are a marginal Polynesian group of people, unified in language and religion. Their language is a dialect of Polynesian which resembles that of the Ellice, Tonga and Samoan Islands. In contrast to most other people of the New Hebrides, the

Futunese are tall, well-proportioned and strong, with rather broad good-looking faces, their skin colour varying from light to dark brown. For dress the women wear a grass skirt and some upper covering when a European is around; the men wear a lava-lava on week days but shorts and a shirt for going to the Presbyterian Church on Sunday.

Causes of Depopulation

I shall consider now, in their particular application to Futuna, those factors to the operation of which, in a greater or less degree, the depopulation of Melanesia has been attributed by former authors (Speiser, 1911; Durrad, 1922; Rivers, 1922; Buxton, 1926; Baker, 1929; Lambert, 1934).

Table I: Summary of Total Population Figures

Date.	Total.	Sex ratio.*	Date.	Total.	Sex ratio.*	Date.	Total.	Sex ratio.*
1871	900	—	1899	290	—	1935	266	109
1883	527	91	1900	287	—	1936	267	118
1885	529	—	1917	320	—	1937	266	119
1886	515	—	1926	235	92	1938	266	118
1887	512	—	1928	244	94	1939	266	118
1888	510	—	1929	250	88	1940	271	123
1892	480	—	1931	250	89	1941	282	116
1893	347	—	1932	249	97	1945	304	105
1895	330	—	1933	258	103	1947	270	114
1897	310	—	1934	259	108	1951	319	111
						1952	294	108

* Number of males per 100 females.

All the available data (set out in Table I) clearly demonstrate the now familiar pattern of the impact of the white man on communities indigenous to the Pacific area, *viz.*, a decline in population, chiefly attributable to blackbirding activities and the ravages of introduced diseases, followed by the gradual recovery of the people in more recent years due to the adoption by Europeans of less coercive methods of recruiting labour and the acquisition by the indigenous peoples of a higher degree of resistance to introduced diseases.

During my stay in Futuna, I was able to see every one of the 294 people. Of these, I made a physical examination of 284, including the taking of a blood film. The figures are given in Table II.

Apathy due to loss of old customs is a factor that is not valid on Futuna. People in the New Hebrides are not apathetic. Dancing and feasting still occur at appropriate times. They certainly find much to enjoy and look forward to in their life.

Loss of power by the chiefs is not an operative factor on Futuna, where the hereditary chiefs still have considerable power.

Lassitude due to abundance of food. There is more food now than before, and the population is increasing.

Inter-tribal wars never occurred during the period of residence of Dr. Gunn, during which time the population was falling steadily. The Futunese did not

Table II: Age and Sex Distribution

Age.	Total.	Totals.		Iasoa.		Ipau.		Isia.		Matangi.		Monga.	
		Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
0-1	15	10	5	2	1	4	1	1	1	1	2	2	—
2-4	52	35	17	4	2	12	4	4	1	8	3	7	7
5-9	36	17	19	2	4	5	9	1	3	5	2	4	1
10-14	33	9	24	1	2	1	6	2	2	2	7	3	7
15 and over	158	81	77	10	8	22	25	14	9	14	15	21	20
	294	152	142	19	17	44	45	22	16	30	29	37	35

I was struck by the great age of some of the natives, estimated not only by physical signs but what they could remember. I estimate that there are 18 people of 70 years and over on Futuna — 9 males and 9 females. Four of these I consider to be 90 years and over.

fight among themselves but did have skirmishes with Tongans and others.

Lack of selection is a factor that has not operated on Futuna.

Firearms. Not important on Futuna as a cause of mortality.

Recruiting. This is a euphemism for the slave trade in the old days. Of 107 males and 6 females taken from Futuna during October, 1866, to June, 1871, only 25 men returned. It cannot be without significance that the halt of the steep fall in the population curve comes at the time when the Importation of Native Labour to Australia was made illegal (1901).

Endemic diseases. Yaws and hookworm are the two most common endemic diseases. These do not cause mortality, but undoubtedly lower resistance to other introduced diseases.

Introduced diseases constitute the factor that, in my opinion, is the most important of all in killing off the population.

Lack of hygiene. The tendency of the natives to huddle together in a hut, and to stool in neighbouring bushes, must have been the cause of many deaths.

Breaking down of primitive quarantine barriers. There are less barriers now, and the population increases.

European clothing. The amount worn has not changed, and I do not consider that this has affected to any marked degree the morbidity or mortality.

Unnatural sexual practices do occur, but not commonly. This factor does not affect the population.

Too close intermarriage has certainly not affected the stock of Futuna. There are many infusions of new blood from the other islands.

Ill-treatment of women does not occur on Futuna.

Female sterility is not noticeable.

Abortion is very uncommon.

Infant mortality. From the available figures it is not possible to give infant mortality rates.

Infanticide. I have never heard of this occurring on Futuna.

High sex ratio. It can be seen that in spite of the unfavourable sex ratio, the population has increased.

Cannibalism did occur on Futuna before the arrival of the missionaries.

Tinned meats are not available on the island. Fish, chickens and pigs are abundant — as well as crops.

Alcohol is not available on Futuna.

Drugs. Kava (*Piper methysticum*) is the only drug commonly used. This does not affect the health of its users significantly.

Lack of education. There was no lack of education in Dr. Gunn's day, and the population was decreasing.

Thus, it may fairly be concluded that over the period 1871-1926 this island's decrease in population can be traced to the following, which are listed in their order of importance:

(i) *introduced diseases*;

(ii) *recruiting* — which was responsible in the main for the introduction of new diseases, and also for high mortality rate amongst the labourers after their recruitment;

(iii) *lack of hygiene,* which encouraged the spread of the white man's diseases; and,

(iv) *endemic diseases* which lowered resistance.

The present upward trend in numbers of the population can be considered as due entirely to the resistance which has been acquired by the people to introduced diseases. There is no medical care on Futuna, and there has been none since 1903. There has been no improvement in hygiene, and no adoption of quarantine measures.

Dysentery, measles, influenza, tuberculosis, whooping cough, etc., have all been introduced by the white man. We have these facts at our disposal, taken from various records:

1867—August: "Influenza among the natives."
1868—July: "Great deal of sickness among natives."
1869—October: "Influenza among natives."
1870—April: "Dysentery and sore eyes amongst natives."
1871—December: "Sore eyes and dysentery among natives."
1880—"Native reports of a wasting disease."
1892—"133 died of dysentery."
1924—"24 died of dysentery."
1943—"14 died of cold and fever."

It can be seen, therefore, that the major illnesses recorded are introduced diseases, and that their effect has at times been catastrophic, *e.g.,* 1892. Since the beginning of this century, communications have increased between Futuna and the other islands (1866-71, 18 vessels called at Futuna) and the danger of introduced diseases has, if anything, been increased. Dr. Gunn retired in 1903, and the island has been left without medical attention since that time. Yet the population is on the increase. It is my view that the present upward trend is due almost entirely to the islanders acquiring an immunity to the introduced diseases.

At present, there is no dresser on Futuna, but I left supplies of medicine with the two traders.

Last Medical Survey
(23rd Nov. - 12th Dec., 1952)

Head lice: Almost universal amongst the females.

Influenza: Following the arrival on 23rd November, 1952, of the ship *Bateman's Bay,* influenza broke out amongst the natives. I saw and treated 64 cases (42 were having the penicillin treatment for yaws: penicillin did not influence the attack in any way). There were no serious cases and no deaths.

Filariasis: No microfilaria seen; no cases of elephantiasis.

Yaws: Out of 286 people examined, 164 had active yaws, *i.e.,* 61%. In addition, 79 had sequelae of yaws, and only 43 islanders were seen without any physical signs of yaws.

Malaria—the Malaria Parasite: Thick blood films were taken from 286 out of the 294 people on the island. No plasmodia were found in any film.

Spleen Examination: The spleen index is nil.

Nutrition: The Futunese are well nourished, and I saw no signs of undernourishment. Usually in the evening a lap-lap is prepared by cooking in the hot stones. The basis of this "pudding" is often a root crop with coconut cream. Flying fish, barracuda, groper and many kinds of fish and shellfish are eaten, so that proteins are plentiful. Plantains and bananas are roasted. Pigeons are eaten, being shot with blunt-headed arrows. Breadfruit storage pits were seen.

The Mosquitoes of Futuna

No anopheline mosquitoes were seen. Three species were represented among those collected—*Aedes scutellaris hebrideus, Culex sitiens,* and *Tripteroides coheni.*

In this survey it has been shown that Futuna is free from anophelines and malaria, in spite of permanent water sources. In view of the proximity of Tanna, Aneityum and Aniwa, all of which are infected with malaria carried by *Anopheles farauti,* it would be surprising if the mosquito had never arrived on Futuna. There are many small ships and even canoes which could have carried the adults and the larvae.

There is, indeed, no reason to assume that the agency of man was necessary, for the currents in the upper air going in the opposite direction to the usual East or South-East winds could easily carry the mosquito over a distance of 45 miles. Efate to Erromango is double the distance from Tanna to Futuna, and presumably *A. farauti* was able to cross this stretch of water, and many others much greater in a similar manner.

Geographical isolation therefore must be ruled out, and I think we must assume that at various times the anopheles mosquito has reached Futuna. There would for it such as seepages at various points, also seem to be suitable breeding places often brackish, and small streams.

The geological structure of Futuna is similar to other islands in the Group where *A. farauti* lives, it being of the second type described by Buxton (1927). It is probable that some ecological factor makes Futuna an unsuitable breeding place for *A. farauti.* As there is nothing to go on, I have made my description of the island as detailed as possible, for the amassing of facts must be the first stage in elucidating the problem. This narrows down the problem to an ecological or physiological one, as it is probable that this is the reason for the anopheles-free area of the Pacific.

Many of the above conclusions provide no reason for complacency, because there is no doubt that medical care and hygiene would have saved many lives and augmented the upward trend of the population. This underlines once more the basic problem of the New Hebrides —to get simple medical care and hygiene to the native on his own island.

Disposal of Dead Coconut Palms

IN Ceylon, where the rhinoceros beetle is widely prevalent, one measure of control consists in keeping plantations clean and free of decaying coconut trunks, which serve as breeding places.

When palms are felled during the course of replanting old areas or for other reasons, the trunks are cut into 6-foot sections and split lengthwise. The boles are dug up and also split in the same way.

The split sections of the trunks and boles are then stacked with the cut surfaces upwards, in the manner shown in the diagram, and left to dry. In sunny, windy weather drying should be complete in less than a fortnight.

The crowns, from which the branches have been removed preparatory to felling, are split in halves or quarters through the bud tissue and also left to dry.

The split crowns and dried branches are then placed inside and against the enclosures made by the stacked split trunks and boles, and fired. If drying is complete, the whole mass will burn to ashes; otherwise, further firing will be required. In any case, once the material is charred, the female rhinoceros beetles will not lay eggs in it.—W.V.D.P.

The author of this article is a coconut planter of long experience. He was for many years Superintendent of Estates, Coconut Research Scheme (now Institute), Ceylon. The information and advice on the erection of the standard Ceylon kiln, and the drying and grading procedures practised in that island, are based on Leaflet No. 15, issued by the Coconut Research Institute of Ceylon.

There are many types of copra dryers in Ceylon, including hot-air dryers, but for the time being the bulk of the quarter of a million tons of copra produced annually in that island is made in the type of kiln described below.

It will be noted that the design differs in important details from that of the dryer in popular use in Papua and New Guinea, known as the Ceylon type dryer.

Standard Ceylon Copra Kiln

P. J. NONIS

Superintendent, Olaboduwa Group (Messrs. De Soysa & Co. Ltd.), Gonapola, Ceylon

THE capacity of this kiln is 10,000 nuts, allowing a daily intake of 2,500 nuts. Smaller kilns to suit individual requirements may be built on the same principle.

SPECIFICATIONS

Fire Pit: 30' x 12' x 2' deep. If the bottom of the pit is of loose sand, a 6" layer of gravel should be spread evenly and well rammed down to provide a firm foundation.

Foundation: 2' x 14" up to ground level.

Walls: 9" walls carried up to a height of 4 feet from ground level, *i.e.*, up to the copra platform; and a 4½" wall above the platform at the back and two ends. The walls are strengthened by 14" pillars which are provided at intervals of 10 feet. These pillars are carried up so as to support the roof.

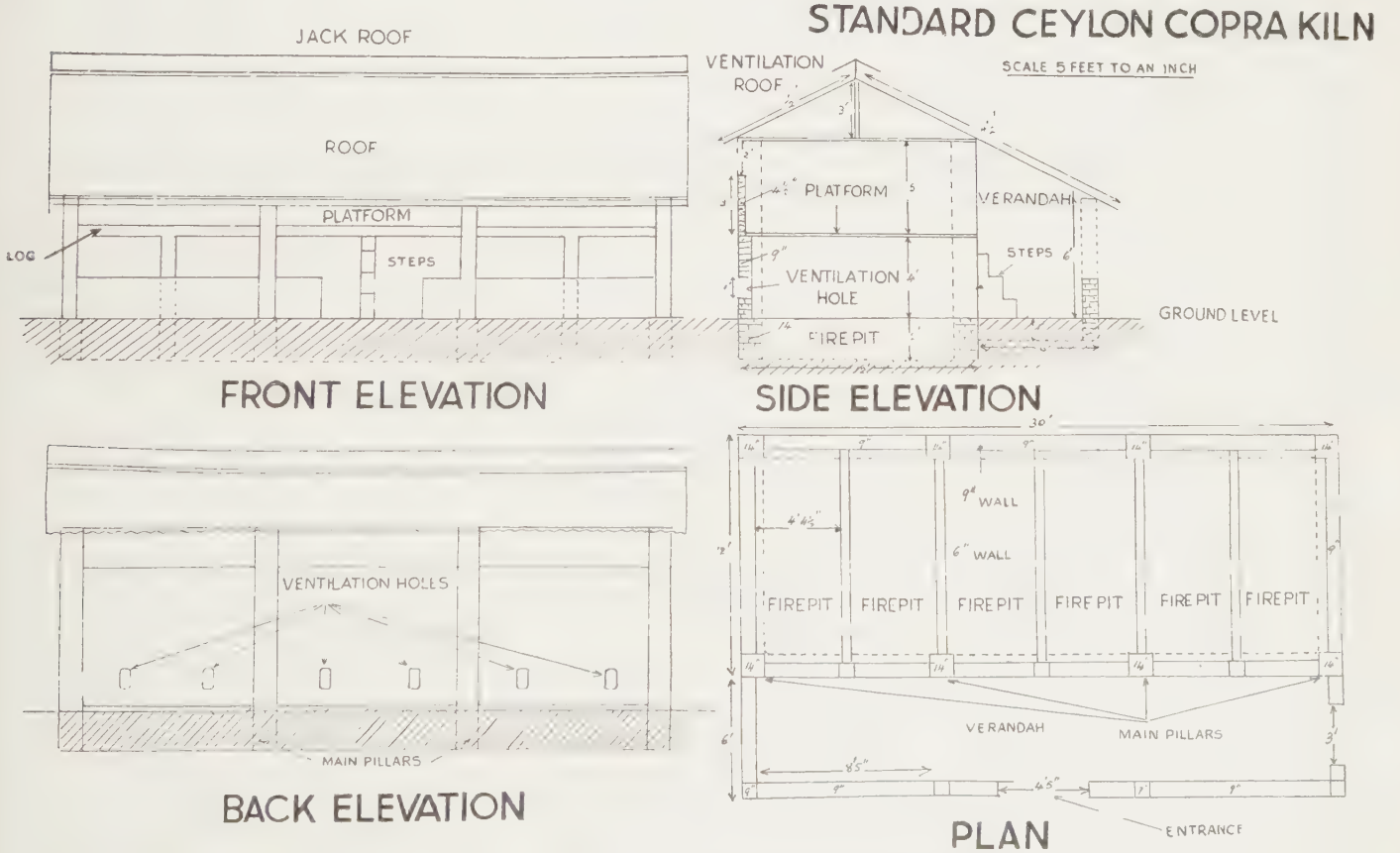
The fire pit is divided into six compartments by means of five 6" walls also reinforced by 14" pillars.

Ventilation: Ventilation holes are provided in the gable walls as well as in the back wall; and each section of the fire pit is open in front. Ventilation holes, 6" x 12", are provided 1 foot above ground level at intervals of 2 feet. Ample ventilation is provided above the copra platform. Humid air escapes via the "jack roof" and from the gable ends.

Roof: Well matured and seasoned timber should be used for wall-plates, beams and wing-posts. Rafters may be of well-matured coconut timber placed 2 feet apart; and reepers, 3 feet apart. Corrugated iron or asbestos sheeting may be used for covering the roof.

Platform: Well-matured areca nut (betel nut) slats about 1½" broad are placed lengthwise across the dividing walls with their ends resting on the 2" ledges of the side walls. Slightly broader slats are placed across the longitudinal slats and secured together with galvanized wire.

A thick log of hardwood or a strong, flat plank 1 foot broad is laid along the



Reproduced with acknowledgements to the Coconut Research Scheme, Ceylon.

CEYLON COPRA KILN: MATERIALS AND COSTS

PLATFORM

Bricks	12,000	Gravel	11 cubes
Cement	20 bags	Clay	15 cart loads
Sand	2 cubes	Lime	50 bushels

(NOTE: One cube equals 100 cubic feet.)

TIMBER

Wall plates and ridge plates	33′ x 3″ x 5″, 4 pcs.
Ridge plates for jack roof	33′ x 2″ x 3″, 3 pcs.
Cross beams	14′ x 4″ x 5″, 4 pcs.
King posts	3′ x 3″ x 3″, 4 pcs.
King posts for jack roof	1½′ x 3″ x 2″, 4 pcs.
Rafters	8′ long, 16 pcs.
Rafters	14′ long, 16 pcs.
Reepers (laths)	2″ x 1″, 455 ft.
Zinc Sheets—24 w.g.cwt.	8′ long, 16 pcs.
24 w.g.cwt.	9′ long, 16 pcs.
24 w.g.cwt.	7′ long, 16 pcs.
Galvanized ridging	33 feet
Clips	200
1 heavy plank, 1 ft. broad	30 ft. long
Areca (betel) nut trees for slats	10 trees
Galvanized wire, 1/16 inch gauge	10 lbs.

COST (in Ceylon)

Kiln	£stg.225
Barbecue	£stg.40

outer edge of the platform to prevent the copra from falling out.

Surface Drains: A surface drain should be provided right round the kiln to lead away any rain water dripping from the roof.

Barbecue: To ensure cleanliness, a barbecue may be provided on which to spread the split halves of nuts for sun-drying before they are taken into the kiln. This should be a sloping platform made of brick or concrete in close proximity to the kiln. A suitable area would be 30' x 30'. The barbecue should be provided with a shallow surface drain on the lower side, and a water-collecting tank at the lowest point.

Drying Programme

The nuts should be split and the halves laid carefully, face upwards, on the barbecue and sun-dried for one day, provided there is no interference from rain. In the afternoon, the halves should be transferred on to the drying platform of the kiln. Care should be taken that the depth of the halves on the platform does not exceed 12 inches. Double rows of coconut shells should be placed parallel to each other in the fire pits. The shells should be so arranged that each fits into the cavity of the other.

The following firing programme should then be followed, the curing process taking five days (*i.e.*, eight to nine firings):—

First day: Sun-drying till 5 p.m. and first firing, with two double-rows of shells per compartment, till 10 p.m., then allow to cool.

Second day: Second firing at 2 a.m., *one* double row of shells per compartment. At 4 p.m., turn the copra so that the bottom halves come to the top, and vice versa. Then place another double row of shells for the third firing, which should last till 10 p.m. Allow to cool.

Third day: Fourth firing with one double-row of shells at 2 a.m. At 4 p.m., remove the shells from the halves. Commence fifth firing at 5 p.m., which continues till 10 p.m. Then allow to cool.

Fourth day: 2 a.m., one double-row of shells for the sixth firing. At 4 p.m., turn the copra halves as before. At 5 p.m., the seventh firing with one double-row of shells till 10 p.m., and then allow to cool.

Fifth day: 2 a.m., eighth firing with short, double-rows of shells set alight at two sections in order to ensure an even distribution of heat. At 5 p.m., grade and remove cured copra to the store, leaving the under-dried halves for a further firing with short, double-rows of shells, which are set alight at two sections as before.

Grading

Copra No. 1: The hard, smooth, crisp and uniformly greyish white halves with a translucent fracture, which constitute copra from the well-matured nuts, are graded as No. 1 copra. These should not contain more than 6 per cent. moisture.

Copra No. 2: This quality comprises distorted halves from under-ripe nuts; thin and broken copra from germinated nuts; scorched, or off-colour copra.

Copra No. 3: This comprises all rubbery copra from immature nuts, and all kernels of decayed nuts.

Fiji Plant Introduction Station

(*Continued from page 25*)

approximately 350 trees have been established on the station.

Three hundred seedlings of Amelonado/Forastero, a local selection, were issued to a Fijian grower.

Coffee: The coffee plots have been extended and shade and cover crops established. The New Caledonian plants have commenced flowering, so that seed from these will shortly be available.

Fruit Trees recently introduced include: cashew nut, three strains; litchi nut, air-layered marcots; pecan nut, Pabst; mango, Kensington Pride; figs, two varieties; avocado, four varieties.

Pepper (Piper nigrum): A consignment of cuttings from Borneo via Singapore was unfortunately delayed in transit and none survived. The previous introductions have thrived, and a few distributions have been possible. The station plot has been extended to enable large numbers of plants to be propagated. Some of the plants are in bearing, and the variety appears to be satisfactorily established.

Spices and Condiments: Seeds of ten species from Singapore were received and added to the collection of those of local origin.

Root Crops: These comprise local and overseas collections of sweet potato, yam, taro and other species. Below is the yield record of some of the yam varieties:

Variety.	*Tubers No.*	*Tubers Weight (lbs.)*	*Origin.*
Muarapoe	56	196	New Caledonia
Rewamoin N.	35	66	New Caledonia
Rewamoin	59	96	New Caledonia
Riando	114	329	New Caledonia
Rewamoin Av	11	25	New Caledonia
Guano mindin	11	29	New Caledonia
Peya	6	22	New Caledonia
Bombay	13	50	India
Taniela D. leka	10	14	Fiji

Fifteen other varieties produced tubers of six ounces average weight.

Eleven varieties of taro have been established.

The crop from the seven varieties of sweet potato on the station was poor, but planting material is available and is being set out in a new area.

Canna indica has done very well. It produces a heavy crop of edible rhizomes, which also provide a useful arrowroot. It would appear a useful crop for trial as a reserve food resource in areas where periodic food shortages occur.

West Indian and Polynesian arrowroots have given good results, and ample material for propagation of the former is now available.

Trees: From Hawaii was received a most valuable gift of seeds of 20 economic and ornamental species, nearly all new to the South Pacific. From Queensland came seeds of eight species, and from Burma, Malaya, Trinidad, Kenya and Jamaica seeds of some twelve useful trees were received.

Seeds and plants were distributed during the period to most territories in the South Pacific: Tahiti, Niue, Rarotonga, Western Samoa, Eastern Samoa, New Caledonia, New Hebrides, British Solomon Islands Protectorate, Papua and New Guinea, Netherlands New Guinea and Fiji, whilst distributions were also made to Hawaii, Texas (U.S.A.), Western Australia, Queensland (Australia), and Rhodesia, Dakar, Kenya, Nigeria (Africa).

Lists of introductions, of trees and permanent crops, and of seeds and plants available for distribution are prepared and circulated from time to time. A complete system of recording has been established covering details of all introductions and distributions; observations on growth and behaviour of the many species grown on the station recorded monthly, and flowering, seeding and yield data. From these will be prepared a series of reports on each of the more important species or groups of species now growing at the station.

Grants-in-aid made from 1949 to 1953 by the Commission to the Fiji Government for the Naduruloulou Station total £stg.12,960. A further sum of £stg.4,000 is available for 1954.

SOCIAL DEVELOPMENT SECTION

Quarterly Reading List No. 10

A bibliography of publications relating to social development in the South Pacific.

THE Quarterly Reading List represents an attempt to note every item to appear in the field of Social Development in the South Pacific; the entries are drawn from over 100 periodicals which are examined each quarter, as well as from bibliographies, publishers' notices and similar material. While it is clearly impossible to check for errors which may occur in the latter type of material (for example, in the classification used in the original sources or in the entries themselves), it is felt that this danger is outweighed by the relatively complete coverage given by this method of compilation. Items marked with an asterisk have not been seen in the Social Development section.

The Executive Officer for Social Development, G.P.O. Box 5254, Sydney, will be glad to obtain for any metropolitan or territorial Government copies of items listed, even though the original material may not be available in Sydney.

SOUTH PACIFIC — GENERAL

Anthropology

(1) "American Indians in the Pacific: The Theory Behind the Kon-Tiki Expedition". A Review. *Journal of Austronesian Studies* 1 : 1 1953, p. 152-155.

(2) France. Ministère de la France d'Outre-Mer. Office de la Recherche Scientifique Outre-Mer. Courrier des Chercheurs. No. 6, 1953, p. 23-26, bibl.
Anthropological research being undertaken at the Institut Français d'Océanie, Noumea, by M. J. Guiart.

(3) Guiart, J.: Une expérience personelle de l'enquête sur le terrain. *Centre de Formation aux Recherches Ethnologiques Bulletin*, No. 6, Juin, '53.*
Some field methods used by a Pacific Anthropologist.

(4) Tri-institutional Pacific Programme: *Pacific Science Association Information Bulletin.* January, '53, p. 1; July, '53, p. 11-12.

Art

(5) Wingert, P. S.: Art of the South Pacific Islands. London, Thames and Hudson, 1953. 64 p., illus., maps, bibl.

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(6) I.P.R. Publications on the Pacific, 1925-53. New York Institute of Pacific Relations, 1953. xii, 117 p.
Lists publications by geographical units and has an author index.

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(7) Sayers, C. E.: Co-operation Spreads in the South Pacific. *Review of International Co-operation* 46 : 9 September, '53, p. 216-218.

Geography

(8) Bryan, E. H.: Check List of Atolls. *Atoll Research Bulletin*, No. 19, September, '53, p. 1-38.
Gives name and alternatives, latitude and longitude, and U.S. Hydrographic Office Chart number, of atolls in the Pacific.

Government and Administration

(9) Callahan, J. M.: International Interest and rivalry in Pacific Islands. *World Affairs Interpreter.* Spring, '53.*

(10) Mander, L. A.: New Trends in South Pacific Administration. *Far Eastern Survey* 22 : 11 October, '53, p. 141-145.

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(11) Lenormand, M. H.: Correspondances phonetiques et changements parallèles dans les parlers de la famille austronésienne (Melanésien, Indonesien, Polynésien). *Bulletin de la Société d'Etudes Indochinoise* 27 : 4 Quarter, 1952, p. 1-16.

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(12) Santa, E. Della: Les collections Polynésiennes et Micronésiennes des Musées royaux d'Art et d'Histoire. Antwerp, de Sikkel, 1952. 77 p., illus.*

Navigation

(13) Lindsay, H. A.: Birds Helped to Colonize the Pacific. *Walkabout* 19 : 10 October, '53, p. 13-16, illus. The use of birds in navigation.

Research Institutes and Programmes

(14) Pacific Science Association. Pacific Science Council Secretariat. Organizations engaged in scientific research on an international scale in the Pacific. Honolulu, the Association, 1953. 32 p., diags. Includes descriptions of the South Pacific Commission, the South Pacific Health Service, the Pacific Science Association and the Institute of Pacific Relations.

SOUTH PACIFIC COMMISSION

(15) For the Island Peoples: South Pacific Commission. *The Periodical* 30 : 242, Autumn, '53, p. 100-102, illus.

(16) South Pacific Commission: Tenth Session. *International Organization* 7 : 3, August, '53, p. 441-443.

(17) Het werkprogramma gedurende het eerste kwartall 1953 van de South Pacific Commission, afdeling economische ontwikkeling. *Tijdschrift "Nieuw-Guinea"* 14 : 3, September, '53, p. 91-96.
Comments on the Commission's economic development work programme.

South Pacific Conference

(18) La deuxième conférence du Pacifique Sud s'ouvira à Nouméa le 16 Avril, 1953. *Bulletin d'Outre-Mer de l'Agence France-Presse,* No. 1991, 20 Mars, '53, p. 33-34.*

(19) Robson, N.: South Pacific Conference. *Australian Outlook* 7 : 3, September, '53, p. 164-170.

(20) Second South Pacific Conference. *International Organization* 7 : 3, August, '53, p. 443-444.

(21) South Pacific Commission: Second South Pacific Conference. *Australia in Facts and Figures.* No. 38, June, '53, p. 46-47, illus.

(22) South Pacific Conference. *Commonwealth Survey,* No. 131, 25th September, '53, p. 7-9, map.

MELANESIA

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(23) Hogbin, H. I., and Wedgwood, C. H.: Local Grouping in Melanesia. *Oceania,* 23 : 4, June, '53, p. 241-276; 24 : 1, September, '53, p. 58-76.

(24) McCarthy, F. D.: "Social Anthropology in Melanesia" by A. P. Elkin: a review. *Australian Quarterly,* 25 : 4, December, '53, p. 109-111.

Linguistics

(25) Leenhardt, M.: Langues Mélanésiennes. *In* Société de Linguistique de Paris. Des Langues du Monde. Paris, Centre National de la Recherche Scientifique, 1952, p. 675-690, bibl., maps.

POLYNESIA

Linguistics

(26) Elbert, S. H.: Internal Relationships of Polynesian Languages and Dialects. *Southwestern Journal of Anthropology,* 9 : 2, Summer, '53, p. 147-173, bibl.

(27) Faublée, J.: Langues Malayo-Polynésiennes: Polynésien. *In* Société de Linguistique de Paris. Les Langues du Monde. Paris, Centre National de la Recherche Scientifique, 1952, p. 664-673, bibl., map.

BRITISH SOLOMON ISLANDS

Government and Administration

(28) The British Solomon Islands, 1951-53. *Commonwealth Survey,* No. 129, 28th August, '53, p. 24-25.

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(29) Lanyon-Orgill, P. A.: The Papuan Languages of the New Georgian Archipelago, Solomon Islands. *Journal of Austronesian Studies,* 1 : 1, 1953, p. 122-138.

(30) Napu, B.: A Vocabulary of the Kilokaka Language, Santa Ysabel, Solomon Islands. *Journal of Austronesian Studies,* 1 : 1, 1953, p. 139-144.

FIJI

Communications

(31) Radio Telephone Services in Fiji. *Commonwealth Survey*, No. 129, 28th August, '53, p. 38.

Education

(32) Adam, R. S.: The Construction and Standardization of English Reading Tests for Schools in Fiji. Fiji, Department of Education, 1953. xiv, 74 p., illus., diags. (Educational Research Institute for Fiji and Western Pacific Territories Publication, No. FIER 3.)

(33) "A Short Study of Reading Problems in the Pacific Islands" and "The Relationship between Age and Reading Attainment in Fiji Schools", both by R. S. Adam, and published by the Department of Education, Suva. [A review.] *Overseas Education*, 25 : 3, October, '53, p. 127-129.

(34) Education in Fiji, 1952. *Commonwealth Survey*, No. 131, 25th September, '53, p. 39-40.

Folklore

(35) Biggs, B. G.: A Fijian Fable. *Journal of Austronesian Studies*, 1 : 1, 1953, p. 116-117.

In Namoli dialect of Fijian, and also standard Mbau dialect, with English translation.

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(36) Biggs, B. G.: A Vocabulary and Phrases in the Nandronga Dialect of Fijian. *Journal of Austronesian Studies*, 1 : 1, 1953, p. 106-115.

(37) Biggs, B. G.: A Vocabulary from Nailawa, Viti Levu. *Journal of Austronesian Studies*, 1 : 1, 1953, p. 118-121.

FRENCH OCEANIA

Fishing and Fisheries

(38) Pour un renouveau de la pêche des huîtres perlières nacrières. *Chroniques d'Outre Mer: etudes et informations*, No. 6, Juin, 1953, p. 51-53, illus.

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Agriculture

(39) Netherlands. Ministerie van Overzeese Rijksdelen. Afdeling Voorlichting en Research. Agraria: Nieuw-Guinea. The Hague, the Bureau, 1953. 5 p.*

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(40) Meyer Ranneft, R.: Uittreksel uit het verslag van de tocht naar de Balierivier van 22 December, 1951, tot 9 Maart, 1952, ondernomen door de Controleur van de Wisselmeren. *Tijdschrift "Nieuw-Guinea"*, 13 : 5, January, '53, p. 178-184, map; 14 : 1, May, '53, p. 10-21; 14 : 2, July, '53, p. 46-54.

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(43) Netherlands. Ministerie van Overzeese Rijdsdelen. Afdeling Voorlichting en Research. Cooperaties: Nieuw-Guinea. The Hague, the Bureau, 1953. 14 p.*

Description

(44) Pannekoek, A. J.: Verstappen's "Luchtfotostudies over het centrale bergland van Nederlands Nieuw-Guinea": a review. *Geographical Review*, 43 : 4, October, '53, p. 592-593.

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(46) Feuilletau de Bruijn, W. K. H.: De waterkracht van Nieuw-Guinea. *Tijdschrift "Nieuw-Guinea"*, 14 : 2, July, '53, p. 33-45.

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(47) Feuilletau de Bruijn, W. H.: Grondrechten op Nieuw-Guinea voor niet-Inheemsen (1). *Tijdschrift "Nieuw-Guinea"*, 14 : 3, September, '53, p. 72-83.

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(50) Barrau, J.: Autour des problèmes de la terre; l'utilisation agricole et pastorale des terres en Nouvelle-Calédonie. *Etudes Mélanésiennes*, N.S. 5 : 7, September, '53, p. 35-54, illus., diags., maps.

(51) Glaumont: La culture de l'igname et du Taro en Nouvelle-Calédonie: Travaux gigantesques des indigènes. *Etudes Mélanésiennes*, N.S. 5 : 7, Septembre, '53, p. 25-34.,

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(52) Guiart, J.: L'organisation sociale et politique traditionnelle à Uvéa. (Iles Loyalty.) Noumea, Office de la Recherche Scientifique Outre-Mer, Institut Français d'Océanie, 1953. 49 p., map. *Processed.*

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(55) Gifford, E. W., and Shutler, R.: L'expedition archéologique de l'Université de Californie en Nouvelle - Calédonie. *Etudes Mélanésiennes*, N.S. 5 : 7, Septembre, '53, p. 19-24

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(58) Bloc, P.: The Story of Brossard, the Bush Farmer: Pioneer's Life in New Caledonia. Sydney, Pratten Bros. Pty. Ltd., n.d. 111 p.*

Description

(59) Boilot, P.: Le port de Nouméa. *Travaux*, No. 220, February, '53, p. 170-175.*

(60) Cousot, P. M.: Canaques d'hier et d'aujourd'hui. *Géographia*, No. 21, June, '53, p. 27-31.*

(61) Robson, N.: New Caledonia. *Etruscan*, 3 : 2, September, '53, p. 2-5, illus., map.

(62) Tournée des délégués de la Conférence du Pacifique Sud a Houailou, 25-26 Avril, 1953. *Etudes Mélanésiennes*, N.S. 5 : 7, September, '53, p. 89-94.

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(63) New Caledonia. General Secretariat. Economic Affairs Department. L'economie de la Nouvelle-Calédonie en 1952. Noumea, the Secretariat, 1953. 111 p., tables.*

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(64) Hurlimann, H.: Etudes sur la structure des forêts de la Nouvelle-Calédonie: expériences et proposition. *Etudes Mélanésiennes*, N.S. 5 : 7, September. '53, p. 69-86.

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(94) Trust Territory of the Pacific Islands. Department of Education. Saipan Intermediate School. History and Geography of the Mariana Islands: a course of study for the Seventh Grade. Saipan, the Department, 1953. No pagination.

The course consists of two parts: an outline of the subject matter suggested for study with bibliographic references; and secondly, a guide for teachers in the presentation of the course.

(95) Trust Territory of the Pacific Islands. Department of Education. Saipan Intermediate School. History and Geography of Micronesia: an outline for a course of study for the Eighth Grade. Saipan, the Department, 1953. No pagination.

This course is designed to be used in conjunction with the one prepared for the Seventh Grade (Item No. 94 above).

WESTERN SAMOA

Government and Administration

(96) Norman, A. E.: Self Government for Western Samoa. *Christian Science Monitor*, 13th May, '53.

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Technical Publications in Social Development

THE Commission's Executive Officer for Social Development maintains a small stock of technical publications which will be sent on request to specialist officers working in Pacific territories. Requests should be addressed to the Executive Officer at Box 5254, G.P.O., Sydney.

This service regularly includes such periodicals as *Community Development Bulletin*, *Fundamental Education — A Quarterly Bulletin*, *South Pacific* and *Pacific Islands Education*. Individual publications received during the past three months and available under this service are:—

No. 138
Suggestions for Science Teachers in Devastated Countries, prepared by J. P. Stephenson, Paris, Unesco, 1951. (For a review of this book, see *Pacific Reading*, No. 5, December, 1953.)

No. 139
Community Centres in British Colonial Territories, London, Colonial Office, August, 1953.

No. 140
The United Nations Series on Community Organization and Development: United Kingdom Dependent Territories. New York, United Nations, March, 1953.

No. 141
New Horizons at Tzentzenhuaro—Balance Sheet of a fundamental education centre. Paris, Unesco, 1953.

No. 142
Progress of Literacy in Various Countries —a preliminary statistical study of available census data since 1900. Paris, Unesco, 1953. (Monographs on Fundamental Education VI.)

No. 143
African Languages and English in Education—a report of a meeting of experts on the use in education of African languages in relation to English, where English is the accepted second language, held at Jos, Nigeria, November, 1952. Paris, Unesco, June, 1953. (Educational Studies and Documents, No. II.)

No. 144
Preliminary Survey on Methods of Teaching Reading and Writing, by William S. Gray. Part I. Survey of theory and practices; Part II. Summary of suggested practices. Paris, Unesco, July, 1953. (Educational Studies and Documents, No. V.)

A patrol officer with a native of Mt. Hagen, New Guinea.
— Photo by Colin Simpson.

Australian School Of Pacific Administration

Situated on Middle Head, Sydney Harbour, is a small institution which has a special significance for Papua and New Guinea. It is the Australian School of Pacific Administration, the academic training centre for cadet patrol officers and other members of the territorial Administration.

THE Australian School of Pacific Administration had a wartime origin. When the war in New Guinea was turning in favour of the Allies, Australia, as the home Government for Papua and administering authority for the then Mandated Territory of New Guinea, had the problem of taking up the administrative threads in the territories as the Japanese were driven back.

Many of the remaining pre-war territorial administrative officers had become members of ANGAU, the Australia-New Guinea Administrative Unit of the Army. But more recruits were needed, both for ANGAU and to carry over to civil administration, and to train them it was decided to set up a School of Civil Affairs within the Army.

This school opened in February, 1945, at the Duntroon Army Staff College near Canberra. A distinguished group of authorities on New Guinea and its people in the fields of native administration, anthropology, tropical medicine, agriculture, native education, and so on, were gathered to form the staff, and young men in the services, selected from those interested in making their careers in the New Guinea administration, were given courses of lectures and tutorials in these subjects before going to join ANGAU.

By 1946 the war was over, and the Provisional Administration of Papua-New Guinea, for which the School of Civil Affairs had by then trained a number of competent junior officers, was gradually taking over affairs in the territory. The school, retaining most of its original staff, became the civil establishment ASOPA to continue the training of administrative officers for the territory, and moved to a harbour-side building in Sydney close to its present location.

New administrative cadets were accepted and put through "orientation" courses at the school before going to New Guinea; and pre-war administrative officers, mostly returning from service in ANGAU, attended "refresher" courses which gave them opportunity for discussing problems facing the new peace-time administration.

Pre-war administrative officers of the Territory of New Guinea had gained a background for their work by attending courses at the University of Sydney in anthropology, law and tropical medicine. The post-war school now provided for more diversified courses, specifically planned and grouped to help students towards an understanding of the problems of Papua and New Guinea as dependent territories, and was at the same time a centre of research and discussion on New Guinea affairs.

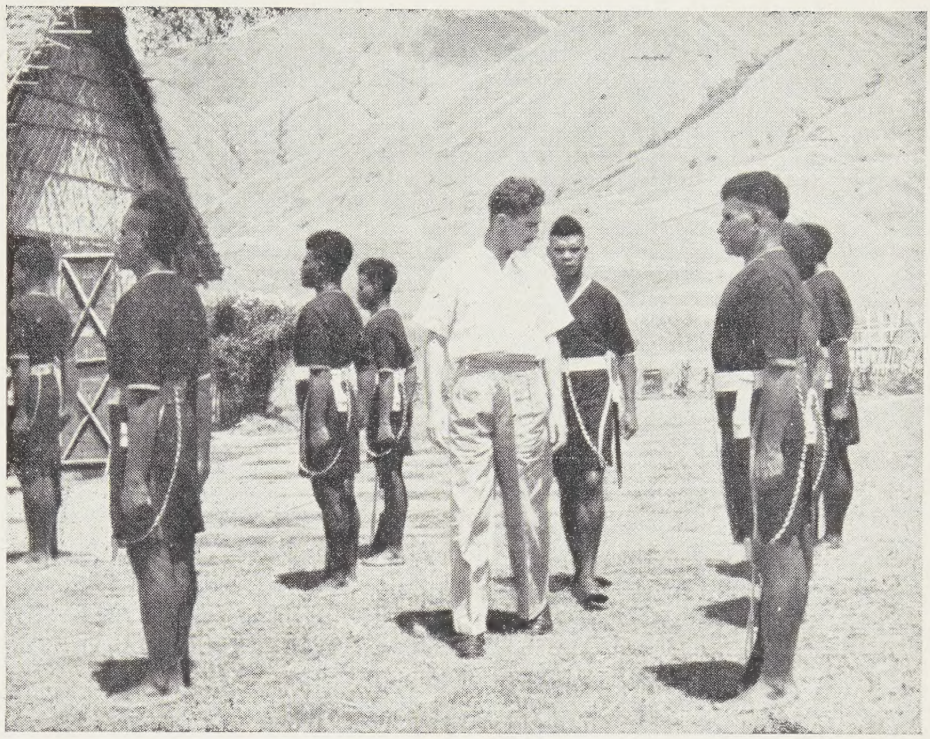
In 1949 the Papua and New Guinea Act, which provided for a permanent administration, confirmed the establishment of the Australian School of Pacific Administration under Section 66, constituting it as a permanent organization—"to provide special courses for the education of officers and prospective officers of the Territory and of such other persons as are prescribed". It provided for a council of the school and for the appointment of a principal and academic staff. By regulations under the Act in 1949 the school was established under the control of the Minister for External Territories, to be advised by the council on matters of administration, conduct and management.

Students of the School

While the function of the school is primarily to provide training for officers of the administrative services of the territory, the range of its work is conceived in broader terms. This is apparent in the variety of persons named as eligible for courses of study there. In addition to courses for cadet patrol officers and more senior administrative officers of the Department of District Services and

Native Affairs of the Territory, professional officers of the technical departments (health, education, agriculture) are provided for in the constitution of the school, as are others involved in territorial affairs such as nominees of the Christian missions, wives of administrative officers, territorial businessmen and others, at the discretion of the Minister. The constitution of the school also envisages courses being held there for natives of the territory whose educational standard fits them for higher training, related especially to their professional work in native councils, co-operative societies and other community ventures.

The school is also conceived as a possible centre for officers of other Colonial services who might find the Pacific bias of its interests useful for their future work. The suggestion that it could provide training facilities particularly for officers of the British and New Zealand territories in the Pacific, if desired by their Governments, was made in 1946 by the then Minister for External Affairs.



A patrol officer with his native police at Memyamya, in the Kukukuku country of New Guinea. — Photo by Colin Simpson.

Courses of Training

Courses of training at the school have, by and large, always had New Guinea as their centre of reference; but as the easing of staff shortages in the territory has made it possible to extend their duration, they have become more and more able to provide for comparative background studies of a high academic standard.

The training at the school is tied in with practical field training in a way comparable to, but in some significant respects differing from, the system in use in Britain for Colonial Service officers. In the British system, recruits to the service are in the main University graduates, and after recruitment normally attend a year's specialized course of study at the Universities of Oxford, Cambridge or London before going out into the field. Refresher courses after tours of duty in the field, and further special studies, are then arranged according to individual requirements and opportunities. In the Australian service recruits to the District Services administration are of Leaving Certificate or Senior Certificate standard, usually without a University training behind them to begin with. As newly-appointed cadets they normally attend an Induction Course of six to eight weeks at the school, and, if they pass successfully through it, do a tour of duty of two years before being confirmed as patrol officers. As soon as practicable after this first two years of field duty they return to the school to attend the Diploma Course, which lasts two years and which is looked upon by all as fairly hard work.

The purpose of the Induction Course is to equip cadets with some background knowledge of the environment and work they are going into; to introduce them to the main problems of native administration; and to make them familiar with some of the useful sources of reference for their field work. An introduction to anthropology is given with particular reference to New Guinea, lectures and discussions are held on government in the territory, its history and geography, native education, law, mapping and survey work, and an introduction to tropical medicine is given. Each student is also expected to take his certificate in first aid.

The same main subjects, with anthropology, law and government as the major courses, are taken in detail in the Diploma Course. By this time the students have come up against many of the problems in the raw, and have a lively interest in finding out more about their history and the methods used to deal with them in New Guinea and in comparable situations. The fact that the comparable situations might take the students back to the Roman Empire or mediaeval Europe, and across to other present-day tropical dependencies, is a sign that the school is concerned with education proper, centred around a particular professional interest, rather than with training in prescribed professional techniques.

Fundamentally, the Diploma Course is designed to equip the field officer with an adequate theoretical and factual background to help him to make intelligent decisions and recommendations on the complex issues which, in his work, confront him. The major problems of under-developed tropical dependencies and their economic, social and political development, lead to the study of land tenure, community development, co-operative organization and education; in social anthropology the study of culture contact is emphasized. Law is an important subject for administrative officers of Papua and New Guinea, who have judicial as well as administrative functions; and it is treated in its territorial context, covering legal interpretation, criminal procedure, evidence and native customary law.

The timing of the Diploma Course, after two years or more of field experience, means that the officers who attend it have made up their minds to continue with their administrative careers in the territory, with a first-hand knowledge of what is involved; many of the less enthusiastic or less suitable have dropped out during their cadetship in the field. It also means that the students, with two years of practical field work behind them, have a very real incentive to gain a fuller understanding of native administration. Although many of them find it difficult, in the first few months, to "go back to school", often after seven or eight years away from study except for the Induction Course, their maturity and

practical curiosity help them to settle in and make for a high standard of study and discussion. Their individual work, apart from attending lectures, includes projects to be written, involving a great deal of reading and thinking, and exams to be passed. On the side of common discussion it has been possible to develop a system of seminars to which both lecturers and students bring the results of study and field experience. In this way the school has always been marked by its give and take between teachers and pupils.

Besides these regular courses for District Service officers, special courses are provided for officers of the Department of Education of the territory; agricultural officers have attended from time to time and senior administrative officers have come for refresher courses. In 1949-50 a series of courses, including intensive work in the speaking and writing of English, were given for New Australian doctors, who had been recruited for service in the Department of Health in the territory.

The education course is designed to last for one full academic year. It comprises courses in anthropology, history, government, geography and land utilization, as well as a study of education in tropical areas with special reference to the needs of the peoples of Papua and New Guinea. Other subjects such as tropical hygiene and the teaching of English as a foreign language are also included. Some of the students are cadets in training who have completed one year at the Sydney Teachers' College; some are certificated primary teachers with teaching experience and a few are university graduates with Diplomas of Education. Hitherto the need for teachers in the territories has been so urgent that those in the last two categories have seldom been enabled to complete the full course; instead they have been given a shorter, introductory, course of from three to five months.

Extension Activities

The publication of a monthly periodical, *South Pacific*, is a feature of the school's activities. Since its first appearance in 1946, this journal has grown up to its present status of an attractive and substantial periodical. It is produced for free distribution to field officers in the territory and others interested. It serves for the publication of original articles on tropical and dependent areas, especially the Pacific territories, and the reprinting of occasional articles of outstanding interest from overseas journals which would not be widely available in New Guinea. *South Pacific* serves also as an avenue for correspondence and material contributed by workers in the field in Papua and New Guinea, which now forms an important and regular part of the content of the journal.

An excellent library has been built up at the school, which in recognition of the generous support which it has had from Sir Edward Hallstrom, is named after him.

Both courage and foresight went into the establishment and strengthening of the School of Pacific Administration under the conditions of war and its aftermath of devastation and staff shortages in New Guinea. In these terms the school has proved itself in its influence on post-war New Guinea administration. It has succeeded in establishing good academic standards of professional education with students of varying educational backgrounds; and, if standards of entrance to the Administrative service are gradually raised, the school seems well equipped to adjust the scope and standard of its own work accordingly.

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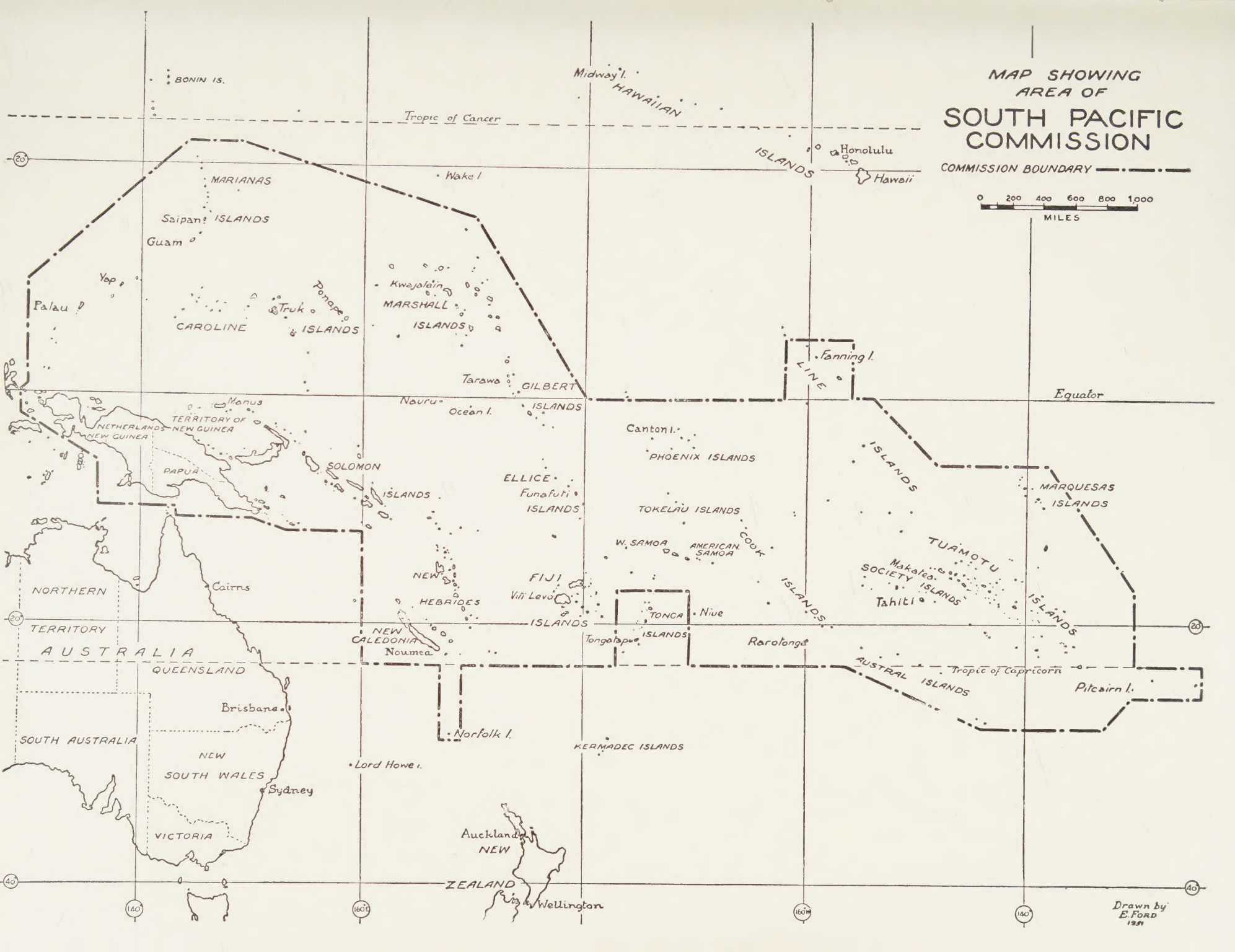
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49. **The Social and Cultural Position of Micronesian Minorities on Guam.** By R. R. Solenberger. October, 1953. 11 pp., map.
50. **Nutrition Investigation in New Caledonia.** By Sheila Malcolm. October, 1953. 33 pp., maps, graphs.
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